

APPENDIX A

ECONOMIC STUDY OF THE IMPACT OF LPFM STATIONS ON FULL-SERVICE COMMERCIAL FM STATIONS

Appendix A.1. Overview of the LPFM and Full-Service Radio Industries

1. This section of our Economic Study provides an overview of the current state of LPFM stations and compares the key statistics for LPFM stations to those of full-service stations, and full-service commercial FM stations in particular. We first examine the technical parameters, geographic distribution, format characteristics, and other operational aspects of LPFM stations and compare them to full-service stations. We then focus specifically on Arbitron ratings data, again comparing LPFM stations to full-service stations.

2. We find that, in comparison to full-service commercial FM stations, LPFM stations tend to be located in smaller markets and more rural areas. Due to their low power and antenna height, LPFM stations also cover a much smaller geographic area than full-service commercial FM stations. The median full-service commercial FM station's signal reaches a geographic area that is 55 times larger, and a population that is 10 times larger, than the median LPFM station. Full-service commercial FM stations are much more likely to specialize in music formats than LPFM stations, which tend more to religious and variety formats. A much smaller proportion of LPFM stations have a website, and/or stream their signal on the Internet, compared to full-service commercial FM stations.

3. From our analysis of Arbitron ratings for Fall 2009, we find that, while the majority of full-service commercial stations achieve sufficient listenership to be rated by Arbitron, only a small fraction of LPFM stations do so. Moreover, the highest rank achieved for an LPFM station in its Arbitron Radio Metro Market ("Arbitron Metro") was eighth for average listenership, and only four LPFM stations were ranked in the top ten, out of 300 Arbitron Metros.¹ In 84 percent of Arbitron Metros, LPFM stations had no measurable ratings in Fall 2009. In those few Arbitron Metros with measurable LPFM ratings, the combined average share of listeners per quarter hour ("AQH Share") for all LPFM stations never exceeded 3.5 percent. Perhaps most significantly, we find that LPFM listening represented less than 0.1 percent of total radio listening, and LPFM stations were listened to by less than 0.2 percent of the radio-listening population, during the period we examined, indicating that LPFM stations have captured only a very small portion of the radio marketplace. Notably, however, we also find, based on Time Spent Listening ("TSL"), that the most popular LPFM stations tend to attract a small but loyal fan base who listen for longer periods compared to the average full-service station listener.

I. State of the LPFM Industry

4. To provide an overview of the LPFM industry, we have gathered and analyzed data available from the FCC's Consolidated Database System ("CDBS") and BIA/Kelsey ("BIA"). Summary statistics regarding the industry are provided in Table 1, Table 2, and Table 3. As of July 5, 2011, CDBS reports that there are 835 active LPFM stations.² Almost all (about 800 stations) are owned by a parent

¹ The number of Arbitron Metros changes periodically, as Arbitron adds or eliminates radio metro markets. In Fall 2009, there were 300 Arbitron Metros, in Fall 2010 there were 290 Metros, and in Spring 2011 there were 282 Metros.

² Several sources of data on LPFM stations are available. The Commission's CDBS public database includes information concerning all radio and TV stations, including LPFM stations. BIA also provides a database, with additional information not included in CDBS. Arbitron provides ratings data on many, but not all, radio stations. All databases tend to have some inaccuracies in their reporting because radio stations frequently change status and content and the databases rely to some extent on self-reporting by those stations. Inaccuracies for LPFM stations may occur due to several factors, including that the LPFM industry is relatively new, commercial databases may (continued....)

entity that owns a single station. As explained in the Report, while LPFM licensees generally are allowed to own only one station, the Commission's rules permit non-profit organizations and government entities with a public safety purpose to hold interests in more than one LPFM license.³ Accordingly, a number of state and county government agencies (such as the States of Colorado, California, and Florida, and Jefferson County, Montana) hold multiple LPFM licenses. Some Native American tribes also hold multiple licenses. The large majority of LPFM stations (97 percent)⁴ originally went on the air between 2002 and 2008. The peak years of entry were 2004 (24 percent) and 2005 (28 percent). Figure 1 provides the start years of currently operating LPFM stations.⁵ Approximately half of LPFM stations are currently operating at the maximum power level allowed under the Commission's rules of 100 watts, and the average power level is 75 watts.⁶ License applications were in competition with other applications, or "mutually exclusive," for 178 (21 percent) of the current LPFM stations. These applications were resolved through settlements between the competing applicants or by awarding the license through the Commission's points system.⁷

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devote fewer resources to maintaining LPFM information than to other types of radio data due to their small size or the interest of the clients of commercial databases, and LPFM stations have limited staffing to correct inaccuracies. While we find the BIA data to be useful for our analysis, we rely on the CDBS list of active LPFM stations because it reports all information that the Commission has on each radio station, and all U.S. radio stations are required to notify the Commission promptly of any changes in their status. In addition, an informal staff examination of the two databases has found that CDBS appears to be more accurate concerning the status of a few LPFM stations. Other lists of LPFM stations are available from radio-locator.com (<http://www.radio-locator.com>), reporting 833 LPFM stations as of August 17, 2011 and LPFMDatabase.com (<http://www.angelfire.com/nj2/piratejim/lpfm.html>), reporting 841 LPFM stations, as of August 17, 2011.

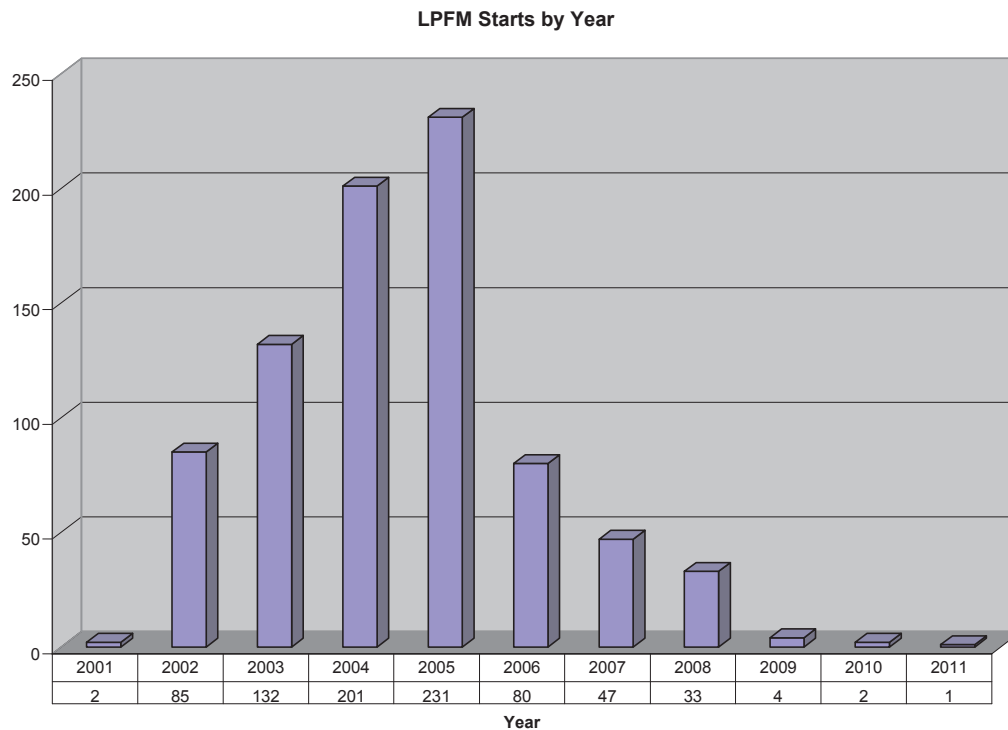
³ See Report at Section III; 47 C.F.R. § 73.855.

⁴ Data from BIA. The on-air start date was not available for 2 percent of LPFM stations.

⁵ This statistic does not include LPFM stations that ceased operations at some point after they went on the air. As of July 5, 2011, there were 20 LPFM stations that are identified in CDBS as "licensed and silent," and 46 LPFM stations that are identified as "license cancelled."

⁶ Most LPFM stations that are operating at less than 100 watts likely are operating at their maximum allowed power level, based on their antenna height. The maximum permissible power level of an LPFM station will be less than 100 watts if its antenna height is above the reference height of 30 meters (~100 feet). In effect, restrictions on power and antenna height limit the range of LPFM stations to 3.5 miles (5.6 km).

⁷ *Creation of Low Power Radio Service*, Report and Order, 15 FCC Rcd 2205, 2258-64, ¶¶ 136-51 (2000); see 47 C.F.R. § 73.872. In total, there have been 693 mutually exclusive applications for 236 groups (*i.e.*, available LPFM licenses in a particular location). The number of mutually exclusive applications in each group ranged from two to 15. A total of 178 LPFM licenses were obtained from the mutually exclusive application process, while the remaining licenses were obtained without competition from other applications.

Figure 1⁸

5. LPFM stations tend to be located in small markets and rural areas. Only 2.2 percent of LPFM stations are located in the 10 largest Arbitron Metros, which collectively contain 26.2 percent of the U.S. population, and only 10.1 percent are located in the 50 largest Arbitron Metros, which contain 54.6 percent of the U.S. population. One third of Arbitron Metros have no LPFM stations.⁹ The majority of LPFM stations (51.7 percent) are located outside of Arbitron Metros, in mostly rural areas covering only 19.2 percent of the U.S. population. It appears that full-service stations and translators are licensed on most of the available frequencies in major cities, and little spectrum is available for LPFM stations.¹⁰ LPFM stations have a median coverage area population (number of people reached by the station's contour coverage¹¹) of 7,672, and an average coverage area population of 13,561.¹²

6. In general, LPFM stations have a wide variety of formats. BIA reports information on both the specific format and the broader format category for most stations.¹³ A large number of LPFM

⁸ Data from BIA. The number of starts per year is listed underneath each year included in the chart. Start dates were unavailable for 17 stations.

⁹ LPFM stations are present in only six of the top 10 markets, 68 of the top 100 markets, and 190 (66 percent) of all of the 290 Arbitron Metros that existed as of Fall 2010.

¹⁰ See, e.g., *Creation of a Low Power Radio Service*, Third Report and Order and Second Further Notice of Proposed Rule Making, 22 FCC Rcd 21912, 21932-34, ¶¶ 50-53 (2007).

¹¹ Data and definition from BIA.

¹² Because the data are highly skewed, in our analysis we will rely more on the median value than the mean value for most variables. The median value should better represent the value for a typical station because the high values of some stations will significantly raise the mean (average) value for some measures.

¹³ BIA provides several variables that describe stations' formats: Format Category, Format, Format-Primary, Format-Secondary, and Format-Tertiary. The format category variable provides 20 broad categories for formats (excluding "Dark – Not On Air"), while the primary, secondary, and tertiary format variables provide a more (continued....)

stations have a religious-oriented format. Of the 771 LPFM stations with an identified format, 381 (49 percent) are included in the “religion” format category, according to BIA’s database. This category includes religious music and religious talk. If we group BIA’s music-focused format categories, we find that 12.6 percent of LPFM stations have music as their primary format. The most popular types of music formats are rock (2.2 percent), classic rock (1.2 percent), oldies (2.3 percent), and country (1.3 percent). Gospel or Southern Gospel is listed as a format for 15 (1.9 percent) stations. There are 28 (3.6 percent) LPFM stations with a Spanish format and two stations with an ethnic format. In addition, 254 stations (33 percent) were classified in the “miscellaneous” format category, while only two have news formats and four have talk formats. In BIA’s list of more specific formats, there are 219 (28.2 percent) variety stations. Thus, a much larger proportion of LPFM stations provide a variety of programming than provide a single music format.

7. The majority of LPFM stations do not appear to have a website. BIA reports that only 363 LPFM stations (43.5 percent) have a website. This number may be overstated because some of the websites listed by BIA are for a syndicated network that supplies the LPFM station with network programming.¹⁴ In addition, it appears that only a small minority of LPFM stations stream their signals on the Internet.¹⁵

II. Comparison With Full-Service Radio Stations

8. To understand the place of LPFM stations in the radio industry, we compare their statistics with those of full-service (also known as full-power) stations, and with full-service commercial FM stations in particular. BIA’s database lists 14,563 active full-service stations; of these, 9,861 are FM stations and 6,468 are full-service commercial FM stations.¹⁶ Most full-service stations have been on the air much longer than LPFM stations. The median on-air year for full-service stations was 1975, and for commercial FM stations it was 1981. Only 11 percent of all full-service stations began broadcasting in 2002 or later, when LPFM stations began entering the market in significant numbers.

9. The power levels of the 6,468 full-service commercial FM stations in the BIA database generally are substantially higher than those of LPFM stations.¹⁷ The median power level of commercial FM stations is 14.0 kilowatts – 140 times greater than that of LPFM stations. A total of 1,214 full-service commercial FM stations operate at 100 kilowatts or more.¹⁸ Full-service commercial FM stations also

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specific description, with about 112 formats provided for full-service stations (excluding “CP – NOA” and “DARK”). The format variable provides a combination of the primary, secondary, and tertiary variables (*e.g.*, if the primary format is Alternative music, and the secondary format is News, the format is Altve/News, and the format category is Rock, reflecting the primary format).

¹⁴ According to Radio-Locator.com, which maintains a database of all radio stations, 400 (48 percent) of the 833 LPFM stations in its database, have websites. Radio-Locator, <http://radio-locator.com> (visited Aug. 16, 2011).

¹⁵ Radio-Locator.com reports that 153 LPFM stations (18 percent) have live audio feeds on the Internet. *Id.*

¹⁶ We relied on the BIA database for this analysis because it provides additional information not found in the Commission’s CDBS database, including format information. There are, however, some differences in the lists of radio stations and station attributes between the two databases. These differences are small and generally do not substantially affect our analysis, except where noted. We note that BIA lacks information about 44 LPFM stations and sometimes has missing data for LPFM stations in its database. Our discussion of some summary statistics is therefore confined to the data that BIA has available.

¹⁷ Commercial FM stations are located in the non-reserved band of the FM radio band. Non-commercial educational (“NCE”) stations have exclusive use of the NCE band of the FM radio band, but some NCE stations are located in the non-reserved band. *See* 47 C.F.R. §§ 73.501(a), 73.202(a)(1).

¹⁸ Not all full-service commercial FM stations have a higher power level than LPFM stations. Twenty-eight full-service commercial FM stations have 100 watts of power or less. However, most full-service commercial FM (continued....)

generally have much higher antenna heights than LPFM stations, with a median height of 155 meters versus 29 meters for LPFM stations. The combination of higher power levels and higher antennas gives commercial FM stations much greater geographic reach in comparison to LPFM stations. For example, a full-service commercial FM station with a median power level and height above average terrain (“HAAT”) has a range of approximately 26 miles, in comparison to 3.5 miles for the median LPFM station. Therefore, the areas covered are 2,104 square miles for the full-service commercial FM station versus 38 square miles for the LPFM station, a ratio of 55 to 1.¹⁹

10. Full-service stations are more heavily concentrated in urban areas than LPFM stations. For example, 5.7 percent of all full-service stations and 4.4 percent of full-service commercial FM stations are located in the top 10 Arbitron Metros. The top 50 markets have 18.8 percent of all full-service stations and 15.8 percent of full-service commercial FM stations. In addition, 40.9 percent of all full-service stations, and 40.4 percent of full-service commercial FM stations, are located outside of Arbitron Metros, where more than 50 percent of LPFM stations are located. With their stronger power, higher antennas, and greater concentration in urban markets, full-service stations generally have much larger coverage area populations than LPFM stations, with a median of 70,122 and an average of 411,460. More specifically, full-service commercial FM stations have a median coverage area population of 76,778, which is ten times greater than that of LPFM stations, and an average coverage population of 415,083, which is more than 30 times greater than that of LPFM stations.

11. Full-service stations and LPFM stations differ significantly in their distribution of formats. As is the case with LPFM stations, religion is the largest format category for full-service stations, but this category represents a significantly smaller percentage of full-service stations’ formats than it does for LPFM stations. Only 18.3 percent of full-service stations and 5.0 percent of full-service commercial FM stations have a religious format.²⁰ If we group music-focused format categories, 51.8 percent of all full-service stations and 83.0 percent of full-service commercial FM stations have a music format, compared to just 12.6 percent of LPFM stations. Country music is the most popular music format for full-service stations, representing 14.2 percent of all full-service stations and 23.3 percent of full-service commercial FM stations, while it is a much less popular format for LPFM stations, at 1.3 percent. It is evident that the format specialization of full-service stations is greater because only a small number of such stations carry the format category of “miscellaneous” – only 5.1 percent of all full-service stations and 1.4 percent of full-service commercial FM stations fall into this category, compared to 33 percent of LPFM stations. Similarly, only 4.2 percent of full-service stations and 1.0 percent of full-service

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stations have higher antenna heights that allow them greater range than LPFM stations are permitted. These 28 stations had a median HAAT of 1,021 meters and an average HAAT of 1,207 meters.

¹⁹ A staff CDBS data analysis has determined that the median power level and antenna height of full-service commercial FM stations are 14,000 watts ERP and 155 meters HAAT, respectively. Using the Commission’s FM and TV Propagation Curves Calculator, available at <http://transition.fcc.gov/cgi-bin/fmtvcur?units=1&dbkkw=1&dbumv=1&svc=1&curv=1&output=2&nor=1#START>, a station operating at this power/height combination would place a 60 dBu contour 41.7 kilometers (25.9 miles) from the transmitter site. In contrast, the 60 dBu contour of an LPFM station operating with maximum facilities, 100 watts ERP/30 meters HAAT, would extend only 5.6 kilometers (3.5 miles). Therefore, the service areas of these respective stations would be 2,104 square miles for full-service commercial FM stations and 38 square miles for LPFM stations, a ratio of 55 to 1. The ratio is much larger if we compare the average commercial station (33,600 watts/229 meters HAAT) to an LPFM station with maximum facilities (100 watts/30 meters HAAT). Under this scenario, the 60 dBu contour of the average full-service commercial FM station would extend 56.2 kilometers (34.9 miles) from the transmitter site, resulting in a service area of 3,827 square miles, *i.e.*, a service area 100 times larger than the service area of an LPFM station operating with maximum facilities.

²⁰ Of the 2,573 full-service stations classified by BIA as having the format of religion, 1,598 (62.1 percent) are non-commercial. This proportion is higher in the FM band – 82.4 percent of the full-service FM religious stations are non-commercial.

commercial FM stations have the specific format of “variety,” compared to 28.2 percent of LPFM stations.

12. BIA reports that 87 percent of all full-service stations and 89 percent of full-service commercial FM stations have their own websites, percentages that are roughly twice as high as that for LPFM stations. Full-service stations also appear to stream their broadcasts on the Internet more frequently than LPFM stations. According to one source, 66 percent of all full-service FM stations and 48 percent of all AM stations stream their signals on the Internet, compared to 22 percent of LPFM stations.²¹

Table 1
Basic Summary Statistics for Full-Service and LPFM Radio Industry for 2011

		All FS Stations	All AM Stations	FM NCE Stations	FM Comm. Stations	FM Comm. in Metros	LPFM Stations
No. Stations		14,563	4,702	3,393	6,468	3,855	835
Coverage Area Pop.	Mean	411,460	546,770	217,020	415,083	667,241	13,561
	Median	70,122	93,853	40,747	76,778	206,580	7,672
Power (Watts)	Mean	20,704	5,758	16,817	33,608	37,938	75
	Median	5,000	1,000	3,000	14,000	20,000	100
Antenna Height: HAAT (meters)	Mean	NA	NA	188	229	256	21
	Median	NA	NA	127	155	182	29
Station Revenue (\$000s)*	Mean	1,632.0	913.1	NA	2,047.0	2,274.2	NA
	Median	475	200	NA	723	850	NA
Parent No. of Stations	Mean	91.5	74.1	40.0	131.1	195.0	NA [†]
	Median	7	5	4	12	24	1 [†]
Has Website	Number	12,667	3,840	3,069	5,758	3,649	390
	Percent	87.0%	81.7%	90.5%	89.0%	94.7%	46.7%
On Air Year	Median	1975	1954	1993	1981	1976	2004

Sources: BIA data accessed, 6/2/11 for full-service stations, 6/21/11 for LPFM stations. LPFM list of stations taken from CDBS.

Notes: FS = Full-Service, NCE = Non-Commercial Educational, Comm. = Commercial. FM Comm. in Metros = Full-service FM commercial stations in Arbitron Radio Metro Markets. LPFM = Low Power FM. Coverage Area Pop. = Number of people reached by the station’s contour coverage. Parent No. of Stations = Number of stations owned by the station’s parent entity. The mean and median values are calculated only for stations with non-zero values reported by BIA for all measures except the antenna height relative to average terrain (“HAAT”), which can be zero or negative.

* Station revenue is estimated by BIA, for full year 2010. BIA does not provide a revenue estimate for most stations in these categories: LPFM stations, NCE stations, stations outside Arbitron Radio Metros, FS commercial stations with very low ratings or revenues, and stations that have never reported revenue data in the past to BIA, which is needed to establish a baseline for that station. The percentage of stations for which BIA reported revenues was: 50.0 percent for AM stations, 0.2 percent for FM NCE stations, 63.2 percent for full-service FM commercial stations, and 92.9 percent for FM commercial stations in Arbitron Metros. BIA reported revenues for only 19.3 percent of FM commercial stations outside of Arbitron Metros.

[†] Data on parent number of stations for LPFM stations is not available from BIA. However, as discussed above, about 800 of the 835 stations have a parent entity that owns a single LPFM station, so the median number of stations is one, and the mean is close to one.

²¹ See Streaming Radio Guide, <http://streamingradioguide.com> (visited Aug. 19, 2011).

Table 2
Statistics on Market Size Locations for Full-Service and LPFM Radio Industry for 2010-2011

		All FS Stations	All AM Stations	FM NCE Stations	FM Comm. Stations	LPFM Stations	U.S. Pop. 2010*
Number of Stations		14,563	4,702	3,393	6,468	835	308,746
Market Location	<u>Arbitron Metro</u>						
	<u>Ranks</u>						
Number of Stations (or People)	1-10	836	335	214	287	18	80,979
	11-50	1,898	764	402	732	66	87,529
	51-100	1,748	599	381	768	88	39,543
	101-200	2,463	732	507	1,224	128	36,241
	201-290	1,664	426	394	844	103	14,051
	<i>Total In Metros</i>	<i>8,609</i>	<i>2,856</i>	<i>1,898</i>	<i>3,855</i>	<i>403</i>	<i>249,376</i>
	Outside Metros	5,954	1,846	1,495	2,613	432	59,370
Percentage of Total	1-10	5.7%	7.1%	6.3%	4.4%	2.2%	26.2%
	11-50	13.0%	16.2%	11.8%	11.3%	7.9%	28.3%
	51-100	12.0%	12.7%	11.2%	11.9%	10.5%	12.8%
	101-200	16.9%	15.6%	14.9%	18.9%	15.3%	11.7%
	201-290	11.4%	9.1%	11.6%	13.0%	12.3%	4.6%
	<i>Total In Metros</i>	<i>59.1%</i>	<i>60.7%</i>	<i>55.9%</i>	<i>59.6%</i>	<i>48.3%</i>	<i>80.8%</i>
	Outside Metros	40.9%	39.3%	44.1%	40.4%	51.7%	19.2%
Average No. of Stations (or People) per Market	1-10	83.6	33.5	21.4	28.7	1.8	8,097.9
	11-50	48.7	19.6	10.3	18.8	1.7	2,244.3
	51-100	35.0	12.0	7.6	15.4	1.8	790.9
	101-200	24.6	7.3	5.1	12.2	1.3	362.4
	201-290	18.5	4.7	4.4	9.4	1.1	156.1
	<i>Total In Metros</i>	<i>29.8</i>	<i>9.9</i>	<i>6.6</i>	<i>13.3</i>	<i>1.4</i>	<i>862.9</i>

Source: BIA data for Fall 2010.

Notes: Metros = Arbitron Radio Metro Markets. Puerto Rico, Arbitron Metro 14, is not included in station or U.S. population totals. There were 290 Arbitron Metros defined by Arbitron for Fall 2010. Arbitron Metros are ranked by population size for Fall 2010. FS = Full Service. Outside Metros = Stations located outside the 290 Arbitron Radio Metro Markets.

*In thousands. U.S. Population sums to greater than 100 percent because of inclusion by BIA and Arbitron of embedded markets in the list of markets.

Table 3
Statistics on Format Categories for Full-Service and LPFM Radio Industry for 2011

Format Category	Number						Percent					
	All FS Stations	All AM Stations	FM NCE Stations	FM Comm. Stations	FM Comm. in Metros	LPFM Stations	All FS Stations	All AM Stations	FM NCE Stations	FM Comm. Stations	FM Comm. in Metros	LPFM Stations
Adult Contemporary	1,425	131	38	1,256	679	3	10.0%	2.9%	1.1%	19.7%	17.7%	0.4%
Album Oriented												
Rock/Classic Rock	579	8	35	536	319	9	4.1%	0.2%	1.0%	8.4%	8.3%	1.2%
Classical	291	8	267	16	11	3	2.0%	0.2%	8.0%	0.3%	0.3%	0.4%
Contemporary Hit Radio/Top 40	543	10	40	493	403	2	3.8%	0.2%	1.2%	7.7%	10.5%	0.3%
Country	2,029	524	22	1,483	653	10	14.2%	11.5%	0.7%	23.3%	17.1%	1.3%
Easy Listening/Beautiful Music	34	14	7	13	8	3	0.2%	0.3%	0.2%	0.2%	0.2%	0.4%
Ethnic	139	98	21	20	8	4	1.0%	2.1%	0.6%	0.3%	0.2%	0.5%
Jazz/New Age	96	9	65	22	20	6	0.7%	0.2%	1.9%	0.3%	0.5%	0.8%
Middle of the Road	44	34	2	8	2	1	0.3%	0.7%	0.1%	0.1%	0.1%	0.1%
Miscellaneous	728	109	531	88	44	254	5.1%	2.4%	15.8%	1.4%	1.2%	32.9%
News	1,282	897	254	131	98	2	9.0%	19.6%	7.6%	2.1%	2.6%	0.3%
Nostalgia/Big Band	248	202	15	31	18	8	1.7%	4.4%	0.4%	0.5%	0.5%	1.0%
Oldies	1,058	366	23	669	369	18	7.4%	8.0%	0.7%	10.5%	9.6%	2.3%
Public/Educational Station	236	12	222	2	-	-	1.7%	0.3%	6.6%	0.0%	0.0%	0.0%
Religion	2,573	769	1,486	318	173	381	18.0%	16.8%	44.3%	5.0%	4.5%	49.4%
Rock	712	25	225	462	345	17	5.0%	0.5%	6.7%	7.3%	9.0%	2.2%
Spanish	752	376	61	315	256	28	5.3%	8.2%	1.8%	4.9%	6.7%	3.6%
Sports	673	546	-	127	101	-	4.7%	12.0%	0.0%	2.0%	2.6%	0.0%
Talk	452	354	22	76	55	4	3.2%	7.8%	0.7%	1.2%	1.4%	0.5%
Urban	388	73	16	299	264	18	2.7%	1.6%	0.5%	4.7%	6.9%	2.3%
<i>No. Stations with Format Provided</i>	<i>14,282</i>	<i>4,565</i>	<i>3,352</i>	<i>6,365</i>	<i>3,826</i>	<i>771</i>	<i>98.1%</i>	<i>97.1%</i>	<i>98.8%</i>	<i>98.4%</i>	<i>99.2%</i>	<i>92.3%</i>
<i>Stations with music-focused format*</i>	<i>7,403</i>	<i>1,370</i>	<i>753</i>	<i>5,280</i>	<i>3,089</i>	<i>97</i>	<i>51.8%</i>	<i>30.0%</i>	<i>22.5%</i>	<i>83.0%</i>	<i>80.7%</i>	<i>12.6%</i>

Source: BIA.

Notes: FS = Full-Service, NCE = Non-Commercial Educational.
Format Categories were defined by BIA., which groups together similar station formats.

*Format Categories defined for this Report as having “Music-focused format” were: Adult Contemporary, Album Oriented Rock/Classic Rock, Classical, Contemporary Hit Radio/Top 40, Country, Easy Listening/Beautiful Music, Jazz/New Age, Nostalgia/Big Band, Oldies, Rock, and Urban.

Other format categories that were not included as music-focused may provide music, along with other types of programming (e.g., Spanish, Ethnic, Religion, and Miscellaneous).

III. Arbitron Ratings Data for LPFM and Full-Service Stations

13. Another area of interest to an analysis of the likely impact of LPFM stations on full-service commercial FM stations is the size of the audience of LPFM stations, as measured by Arbitron. Arbitron provides a number of metrics measuring the audience of radio stations in their markets.²² We

²² Arbitron provided six metrics of listenership included in our dataset: AQH Persons, AQH Ratings, AQH Share, Cume Persons, Cume Ratings, and Time Spent Listening, all for ages 12 and older. Arbitron defines these metrics (continued....)

consider herein the metric Average Quarter-Hour (“AQH”) Persons, which describes the average number of people listening per quarter hour ages 12 and older (and sometimes the related AQH Share). This metric appears to be the best available measure of listenership.²³ For portions of our analysis, we also will examine the metric Cume Persons, which provides a measure of how many different people have listened to the station for the week, and the metric TSL, which measures the average time spent listening for each listener to the station.

14. A number of LPFM stations have measurable Arbitron ratings.²⁴ An analysis of the Fall 2009 Arbitron ratings²⁵ listed 125 LPFM stations representing about 31 percent of all LPFM stations located in Arbitron Metros.²⁶ Of these, 107 LPFM stations had positive (greater than zero) ratings for Cume Persons, but only 53 LPFM stations had positive ratings for AQH Persons.²⁷ We examine next the relative market audience size, compared to full-service stations, of: (1) the average LPFM station; (2) the

(Continued from previous page) _____
as follows: (1) the Average Quarter-Hour Persons (“AQH Persons”) is “the average number of persons listening to a particular station for at least five minutes during a 15-minute period;” (2) the Average Quarter-Hour Rating (“AQH Rating”) is “the AQH Persons estimate expressed as a percentage of the population being measured;” (3) the Share (“AQH Share”) is “the percentage of those listening to radio in the Metro who are listening to a particular radio station;” (4) the Cume Persons is “the total number of different persons who tune to a radio station during the course of a daypart for at least five minutes;” (5) the Cume Rating is “the Cume Persons audience expressed as a percentage of all persons estimated to be in the specified demographic group;” and (6) the Time Spent Listening (“TSL”) is “an estimate of the number of quarter-hours the average person spends listening during a specified time period.” Arbitron, *Terms of the Trade*, available at http://www.arbitron.com/radio_stations/tradeterms.htm (visited Oct. 7, 2011).

²³ For commercial stations, advertising rates and sales depend more on AQH Persons and AQH Share metrics than on Cume Persons. Note that advertisers often prefer to have AQH listenership further broken down by demographic (age, income, ethnicity) and daypart.

²⁴ For convenience, the term “ratings” will be used to denote any of the six metrics reported by Arbitron.

²⁵ Data from Arbitron for Fall 2009, daypart Monday-Sunday for 6 a.m. to midnight (M-Su 6a.m.-12m). For purposes of this analysis, we only used ratings data for Arbitron Metros. Ratings data for about 790 full-service stations in areas outside Arbitron Metros that were included in Arbitron’s report were not included in our analysis, because Arbitron ratings can only be compared to other full-service and LPFM stations inside Arbitron Metros. Canadian and Mexican full-service stations were included in the market statistics used here, if they had ratings in Arbitron Metros, since they were a part of the market. Ratings for stations’ streams on the Internet, provided for 25 stations that signed up for such ratings from Arbitron, were excluded from the statistics. Many of the top 50 markets provided ratings for individual Fall months (October, November, December) for every station. These ratings were averaged over the months with ratings to create a single Fall measure for each station.

²⁶ Arbitron provides ratings in its semiannual ratings reports that usually include only those radio stations that qualify in Arbitron Metros. Thus the 52 percent of LPFMs and 41 percent of full-service stations that are located outside Arbitron Metros will not be included in the reports, unless a station has a signal that reaches into a neighboring Metro and has enough listeners to qualify. Arbitron provides ratings for a station only if the station meets the minimum requirements for reporting, which usually means having a minimum number of listeners in the market. Stations in Arbitron Metros that are not listed, including about 60 percent of the LPFMs located in Arbitron Metros, are absent because they lack sufficient measurable listenership to qualify for inclusion in the reports. We assume these stations have a very small listenership. About 61 percent of all AM stations, 78 percent of all FM stations, and 15 percent of all LPFMs appear in the Arbitron ratings. Full-service stations often appear in ratings reports for more than one Arbitron Metro, because their signals can reach multiple markets. Some full-service stations appear in the reports for as many as 40 different Arbitron Metros.

²⁷ A zero rating does not mean a station has no listeners; instead, it means that the station’s listenership is too low to be measurable. We can assume that stations that are omitted from the report would have zero ratings because they did not meet the minimum requirements for reporting. Stations in the report that have zero ratings are likely to have slightly higher listenership than those that were omitted because these stations met Arbitron’s reporting requirements, but their listenerships were not high enough to be measurable. The minimum value reported for AQH Persons in the Arbitron reports was 100 listeners.

top-rated LPFM stations; and (3) the total of all LPFM stations in each market.

15. The average LPFM station located in an Arbitron Metro has negligible ratings by all measures available and is far behind the large majority of full-service stations. The vast majority of LPFM stations, about 69 percent of LPFM stations located in Arbitron Metros, did not even achieve sufficient listenership in either AQH Persons or Cume Persons to qualify for inclusion in the Fall 2009 Arbitron reports.²⁸ Only 13 percent of LPFM stations in Arbitron Metros (6 percent of all LPFM stations) had positive AQH Persons ratings. In contrast, a significantly larger portion of full-service stations had positive ratings, and these stations generally had higher ratings than LPFM stations. Of all full-service stations, 52 percent had positive AQH Persons ratings. Similarly, 64 percent of all full-service stations had positive Cume Persons ratings.²⁹ The majority (30 stations) of the 53 LPFM stations with positive AQH Persons ratings were reported to have only 100 (the minimum for reporting) or 200 AQH Persons. In comparison, over 8,000 full-service stations had AQH listeners of 300 or more. Only two LPFM stations had more than 1,000 AQH listeners, compared to 4,369 full-service stations. Summary statistics are provided in Table 4.

²⁸ We note that taking the average and median values of LPFM and full-service stations' ratings based on only those stations appearing in the reports may not be representative of the average station in those categories. A large percentage of stations (85 percent of LPFM stations and 27 percent of full-service stations) do not appear in the Arbitron ratings. In addition, many full-service stations appear in the reports multiple times, in multiple markets, and a majority of these entries report zero AQH Persons. Given that stations may appear in the reports zero, one, or multiple times in multiple markets, with zero or positive ratings, defining the population for the average is problematic.

²⁹ The relative proportion of LPFM stations appearing in the Arbitron ratings is difficult to compare on the same basis with that of the full-service stations because of the differences in range and market presence of the two types of stations. The issue is whether the denominator for the calculations of percentage of stations with ratings should be all radio stations, or just the number of radio stations physically located in an Arbitron Metro. The long range of full-service stations (26 miles for the median station, 35 miles for the average station) suggests that many full-service stations physically located outside Arbitron Metros will achieve reception in Arbitron Metros, and therefore receive Arbitron ratings in Metros. This contention is supported by the fact that the number of full-service FM stations appearing in the Arbitron reports for Arbitron Metros exceeds the number of FM stations located in Arbitron Metros by approximately 2,000 stations. Accordingly, at least half of the full-service FM stations located outside Arbitron Metros appear in the Arbitron reports, and this percentage potentially could be even higher to the extent that FM stations located inside Arbitron Metros are not appearing in the reports. Therefore, we will report the percentage of all full-service stations that appear in the Arbitron reports. LPFMs, on the other hand, have a much shorter range of 3.5 miles. Thus, most LPFMs located outside Arbitron Metros are unlikely to achieve reception in a Metro and are excluded from our calculations. Our comparison therefore will be between all full-service FM stations and those LPFMs located inside Arbitron Metros, even though this approach overstates the presence of full-service FM stations in Arbitron Metros, and it understates somewhat the presence of LPFM stations in Arbitron Metros.

Table 4
Basic Statistics on Arbitron Ratings Data for LPFM and Full-Service Stations in Arbitron Metros

	LPFM	Full Serv.	AM	FM
Total number of stations	835	14,563	4,702	9,861
Number of stations in Metros	403	8,609	2,856	5,753
Number of entries in Metros in Arbitron Report	161	26,596	6,329	20,266
Number of unique stations in Metros in Arbitron Report	125	10,581	2,851	7,729
Percent of total stations appearing in Arbitron Report	15.0%	72.7%	60.6%	78.4%
Average number of Arbitron appearances per station	1.29	2.51	2.22	2.62
Highest number of Arbitron appearances per station	4	43	43	39
Number of stations having positive AQH Persons	53	7,511	1,891	5,619
Percent of total stations having positive AQH Persons	6.3%	51.6%	40.2%	57.0%
Percent of total stations in Metros having positive AQH Persons	13.2%	87.2% ¹	66.2% ¹	97.7% ¹
Number of stations with some positive ratings in 6 metrics	107	9,352	2,483	6,868
Percent of total stations with some positive ratings	12.8%	64.2%	52.8%	69.6%
Total AQH Persons as a Share of total U.S. AQH Persons	0.08%	99.92%	16.46%	83.45%

Sources: First two rows from FCC and BIA. All other data from Arbitron, for Fall 2009, daypart Monday-Sunday for 6 a.m. to midnight, for all radio stations in the 300 Arbitron Metros in 2009.³⁰

Notes: AQH = Average Quarterly Hour listening (average number of people listening each quarter hour). Positive rating = rating greater than zero. Except for the last row, all percentages were calculated relative to the total number of stations within the service, listed in the top line.

¹ These estimates are likely to be high because they include in the numerator stations that are located outside Arbitron Metros with Arbitron ratings in Arbitron Metros.

16. Considering how the top rated LPFM stations performed in their markets, the data show that a small number of LPFM stations had a significant ratings presence. Based on the Fall 2009 Arbitron reports, the station with the highest listenership had 2,900 AQH Persons, which ranked the station only 18th in its market. This station's listenership was unusually high for an LPFM station – the next highest LPFM station had far fewer listeners, at 1,200 AQH Persons, and the third highest had 800 AQH Persons. On the other hand, 1,788 full-service stations had 3,000 or more AQH Persons.³¹ Only three LPFM stations had audience shares (AQH Share) exceeding 3 percent, compared to 3,282 full-service stations, and only 19 LPFM stations had shares of at least 1 percent (see Table 5).³² We also examine how the top rated LPFM stations rank in their markets compared to the full-service stations in those markets. In the 300 Arbitron markets that existed in Fall 2009, an LPFM station was ranked among the top 10 stations for AQH Persons only four times and among stations 11 through 20 only 20 times. The highest market rank that an LPFM station reached in AQH Persons was eighth, a rank achieved by two stations in two different markets.³³ Table 5 and Table 6 provide a summary of the AQH Shares, as well as the AQH

³⁰ In 2009, there were 300 Arbitron Metros. As of Fall 2010, there were 290 Arbitron Metros.

³¹ A total of 455 full-service stations had over 10,000 AQH Persons; another 1,101 had 5,000-9,999 AQH Persons.

³² These shares were in the range of 3.3 to 3.5 percent, and the stations were not the same stations as those with the highest AQH Persons.

³³ For Cume Persons, the highest value for an LPFM station is 28,800 people who listened to the station at some point during the week. By comparison, 3,566 full-service stations had Cume Persons of over 30,000. Only one LPFM station placed in the top ten (ranked number 10) for Cume Persons, and 18 placed in the next ten.

Persons and Cume Persons, for the 53 LPFM stations that have positive AQH Shares. Table 7 lists the top 10 LPFM stations for three metric categories.

Table 5
Distribution of LPFM Station AQH Shares

Range of Market Shares	Number of LPFM Stations
3.50-3.99	1
3.00-3.49	2
2.50-2.99	3
2.00-2.49	3
1.50-1.99	3
1.00-1.49	7
0.50-0.99	20
0.01-0.49	14

Source: Arbitron data.

Notes: Number of LPFM stations is the number of LPFM stations with an AQH Share in the range in the left column. Only the 53 LPFM stations with positive values (i.e., greater than zero) for AQH Persons were included in this analysis.

Table 6
Distribution of Market Ranks of 53 Top Rated LPFM Stations for Three Arbitron Metrics

Range of Ranks	Number of Stations		
	AQH Persons	Cume Persons	TSL
1-5	0	0	11
6-10	4	1	3
11-15	12	7	7
16-20	8	11	6
21-25	10	5	9
26-30	9	12	6
31-40	8	7	6
41-50	0	4	3
51-100	2	6	2

Source: Arbitron data.

Notes: Ranks are the ranks of the LPFM stations in their market according to each Arbitron rating metric. Thus, there are four LPFM stations that rank 6th to 10th for the metric AQH Persons in their respective markets. Only the 53 LPFM stations with positive values for AQH Persons were included in this analysis.

Table 7
Top Ten LPFM Stations In Arbitron Ratings, For Various Metrics

	Station	Arbitron Metro	Metro Rank	Format	AQH Persons	Market Rank
Top Ten for AQH Persons						
1	WIGV-LP	Providence-Warwick-Pawtucket	41	Contemporary Christian	2900	18
2	WMDI-LP	Monmouth-Ocean	51	Religious	1200	28
3	WGVV-LP	Quad Cities (Davnprt-RI-moline)	147	Urban Contemporary	800	13
4	KELS-LP	Ft. Collins-Greeley, CO	120	Adult Standards/MOR	700	23
5	WRES-LP	Asheville	159	Urban Contemporary	700	11
6	WUVS-LP	Muskegon, MI	237	Urban Contemporary	600	8
7	KOCZ-LP	Lafayette, LA	105	Variety	600	22
8	WJTW-LP	West Palm Beach-Boca Raton	47	Oldies	600	39
9	WSBL-LP	South Bend	179	Spanish Variety	600	12
10	WSWO-LP	Dayton	61	Oldies	500	26
Top Ten for AQH Share						
1	WWEZ-LP	Brunswick, GA	298	Adult Standards/MOR	3.5	8
2	WLCD-LP	Jackson, TN	292	Urban Oldies	3.4	10
3	WUVS-LP	Muskegon, MI	237	Urban Contemporary	3.3	8
4	KCSA-LP	San Angelo, TX	289	Oldies	2.9	9
5	KBOL-LP	Waterloo-Cedar Falls	251	Urban Adult Contemporary	2.6	11
6	WRES-LP	Asheville	159	Urban Contemporary	2.5	11
7	WSBL-LP	South Bend	179	Spanish Variety	2.2	12
8	WGVV-LP	Quad Cities (Davnprt-RI-Moline)	147	Urban Contemporary	2.1	13
9	WGAG-LP	Bluefield, WV	284	Oldies	2.0	13
10	WIGV-LP	Providence-Warwick-Pawtucket	41	Contemporary Christian	1.6	18
Top Ten for TSL						
1	WPJI-LP	Clarksville-Hopkinsville, TN-KY	201	Religious	2115.0	1
2	WIGV-LP	Providence-Warwick-Pawtucket	41	Contemporary Christian	1860.0	1
3	WFBM-LP	Sunbury-Selinsgrove-Lewisbrg, PA	221	Southern Gospel	1170.0	1
4	KSKQ-LP	Medford-Ashland, OR	208	Variety	1140.0	3
5	WSBL-LP	South Bend	179	Spanish Variety	1050.0	1
6	WBYY-LP	Greensboro-WS-High Point	45	Southern Gospel	825.0	4
7	WJTW-LP	West Palm Beach-Boca Raton	47	Oldies	720.0	1
8	KJIT-LP	Bismarck, ND	282	Religious	660.0	3
9	WCNH-LP	Concord (Lakes Region)	172	Classical	615.0	3
10	WRES-LP	Asheville	159	Urban Contemporary	555.0	4

Source: Arbitron Data.

Notes: Metro rank is 2009 national rank of metro by population. AQH = Average Quarter Hour, TSL = Time Spent Listening. Right-most column lists the rank of each station within its market, for that metric.

17. Notably, many of the LPFM stations with Arbitron ratings achieved high values of TSL. Five LPFM stations had the highest TSL in their markets, and 11 were among the top five. The highest value for an LPFM station was 2,115 minutes (about 35 hours) per week, compared to the highest value for a full-service station of 3,345 minutes (about 56 hours) per week. Only 31 full-service stations exceeded 2,000 minutes per week. Five LPFM stations exceeded 1,000 minutes, compared to 252 full-

service stations. Given that 14 LPFM stations were ranked in the top 10 stations for their markets for TSL, while only four were in the top 10 for AQH Persons and one for Cume Persons,³⁴ it appears that the top rated LPFM stations tend to have high TSL and low Cume Person values, relative to full-service stations.³⁵ These measures suggest that the popular LPFM stations tend to attract a small but loyal fan base who tune-in for long periods and/or switch stations less often than the average full-service station listener.

18. Another indicator of the total impact of LPFM stations on their markets is the collective size of LPFM stations' audiences in each market. Here we find that in no single market did the total AQH Share for all LPFM stations in that market exceed 3.5 percent. Out of the 300 Metros tracked by Arbitron in 2009, LPFM stations had a collective AQH Share of 3 percent to 3.5 percent in only three markets; a share of 2 percent to 3 percent in eight markets; a share of 1 percent to 2 percent in eight markets; and a share of 0.1 percent to 1 percent in 30 markets (see Table 8). In 251 markets (representing 84 percent of all markets, with 91 percent of the population residing in Arbitron Metros) LPFM stations had no measurable market share. The total listening audience (AQH Persons) of all LPFM stations in Metros was only 0.08 percent of the total measured listening audience for all radio stations. The total Cume Persons for all LPFM stations in Arbitron Metros was 376,000 people,³⁶ out of a total population (aged 12+) in the 300 Arbitron Metros of 213 million, and a radio audience of approximately 198 million.³⁷ Thus 0.19 percent of the total radio listening population in Arbitron Metros listened to LPFM stations in Fall 2009, compared to Arbitron's estimate of 93 percent for full-service stations.³⁸ These facts, that LPFM listening represents less than 0.1 percent of total radio listening and that LPFM stations are listened to by less than 0.2 percent of the radio-listening population, indicate that LPFM stations have captured only a very small portion of the total radio marketplace.

³⁴ Based on the 300 Arbitron Metros defined by Arbitron in 2009.

³⁵ Note that most of the data on LPFMs is based on diary data because their markets had not switched to Arbitron Personal People Meters ("PPMs") as of 2009.

³⁶ This number excludes LPFM stations that were not included in the Arbitron data because of their low listenership, so the actual listenership of LPFM stations may be slightly higher. This number also may include some double-counting of people listening to more than one LPFM station in a market, although the number of people who do so is probably very small. In 2009, only 23 markets had more than one LPFM station with positive ratings data.

³⁷ The radio listening population for Arbitron Metros was calculated by multiplying the total population ages 12+ by Arbitron's reported proportion of people listening to radio (weekly Cume rating) of 93 percent. Arbitron, *Radio Today 2010*, at 87.

³⁸ *Id.*

Table 8
Distribution of Collective (Total) LPFM Market Shares by Market

Range of Collective Market Shares	Number of Markets	Percent of Markets	Percent of U.S. Pop. in Metros
3.50-3.99	1	0.3%	0.03%
3.00-3.49	2	0.7%	0.10%
2.50-2.99	4	1.3%	0.25%
2.00-2.49	4	1.3%	0.34%
1.50-1.99	4	1.3%	0.91%
1.00-1.49	4	1.3%	0.29%
0.50-0.99	17	5.7%	2.50%
0.01-0.49	13	4.3%	4.56%
0	251	83.7%	91.02%

Source: 2009 Arbitron data.

Notes: Collective Market Shares are the total market shares of all LPFM stations in each market. The number of markets is the number of markets with a collective market share that falls into that particular range. The Percent of Markets is the percentage of the 300 Arbitron Metros. The last column provides the percentage of the U.S. population in Arbitron Metros (221 million for 2009, according to Arbitron) that lives in those markets.

Appendix A.2. Case Study Analysis

1. In connection with the requirement in Section 8 of the Local Community Radio Act of 2010 (“LCRA”) that the Commission study the impact of LPFM stations on full-service commercial FM stations,¹ the Media Bureau determined that case studies could provide insight into crucial institutional and behavioral details about LPFM stations that would be useful in completing the economic study required by Congress. While a great deal of information about the practices and economic status of full-service FM radio stations is publicly available and easily accessible, relatively little information has been centrally gathered about the operations of LPFM stations. The lack of information about this relatively new class of stations is not surprising, given that LPFM service first came into existence only 12 years ago. Therefore, to supplement the information available from statistical databases, the Media Bureau staff conducted in-depth interviews with eight individual LPFM stations selected based on the criteria discussed below.

2. Specifically, Media Bureau staff undertook the case studies to better document, among other things, the factors affecting LPFM stations’ motivation and ability to provide programming that attracts listeners; their incentives and ability to attract financing, including underwriting support; and the kinds of services they seek to provide. We also sought additional information about the impact that various technical considerations, marketplace factors, and legal and regulatory restrictions have on the behavior and performance of LPFM stations. Further, we sought to gather information to determine whether different types of LPFM stations, such as community-based, educational, government, or religious-oriented stations, behave in significantly different ways and, if so, to account for those differences in our broader economic analysis.

3. We limited the number of stations included in our case studies to eight.² Because the sample was not chosen using a probability sampling method, the small sample may not be representative of the entire population of LPFM stations according to statistical theory, and therefore summary statistics about the sample should not be assumed to accurately reflect the characteristics of the LPFM industry as a whole. Accordingly, we have been cautious in our analysis of the sample of LPFM stations and in extrapolating our findings to the entire population of LPFM stations.³ Nevertheless, we determined that case studies have the potential to inform and improve our Economic Study, by providing us with insights into the incentives and operations of a select group of LPFM stations.⁴ Moreover, wherever possible, we supplemented our analysis of the case studies with independent confirming or conflicting evidence, including broad statistical evidence about the LPFM industry. With these qualifications, some of the key observations from the case studies follow:

¹ Local Community Radio Act of 2010, § 8, Pub. L. No. 111-371, 124 Stat. 4072 (2011).

² Regulations of the Office of Management and Budget (“OMB”) require OMB approval of any survey of ten or more entities or people by a federal agency. 5 C.F.R. §§ 1320.3(a), (c), 1320.5. Undertaking the approval process for a larger study likely would have prevented the Commission from finishing the study in the time allotted by Section 8 of the LCRA.

³ Moreover, we believe there are great uncertainties in attempting to derive general conclusions based on small subsets of the sample, such as on the behavior of LPFM stations owned by educational institutions and government agencies, because we included only one of each of these station types in our case studies.

⁴ The case study approach will not provide sufficient information to directly estimate the impact of LPFM entry on existing full-service commercial FM stations’ revenues and ratings. It would be impossible to determine with any certainty whether a particular full-service station’s revenues have been impacted by the entry of a nearby LPFM station based on observation of just the two stations and the information provided by the case studies. Any observed change in the full-service station’s revenues after LPFM entry could be caused by a number of factors, such as changes in the local economy affecting the demand for advertising, changes in programming by the station, or a shift in consumers’ tastes for that station’s programming. The use of econometric analysis is needed to properly account for those factors. Accordingly, these case studies are complementary to a broader statistical analysis.

- All but two of the eight sample stations are continuously broadcasting 24 hours per day, seven days per week. One exception is a station with a very small budget of approximately \$1,200 to \$2,000 per year and a staff of one person; the other exception is a college station.
- We identified four major types of goals pursued by the LPFM stations in our sample: (1) to provide a particular kind of programming, often reflecting a specific religious or philosophical theme; (2) to provide services that address a specific community need; (3) to provide locally-originated programming, in many cases regardless of the specific content; or (4) to provide training or experience in broadcasting. Notably, none of the sample stations stated that maximizing revenues or listenership is among their goals.
- The stations generally have very small budgets, with a median annual budget for all eight stations of \$10,600. All but two of the stations have annual budgets that range from \$5,000 to \$15,000. One of the stations that falls outside of this range has a budget of \$2,000 or less per year. Although the other station falling outside of this range reported a much larger budget of \$120,000 to \$130,000 per year, that total funds not only the radio station, but also other non-profit ventures owned by the station's parent company. In comparison, BIA/Kelsey ("BIA") reports that the median annual revenue for a full-service FM commercial station was \$723,000 for the year 2010.
- The sources of funding reported by the stations fall into three general categories: (1) organizational support from a sponsoring organization or government agency; (2) donations, membership dues, and revenues from other fundraising activities such as merchandise sales; and (3) underwriting from local businesses. The sources of funding the individual stations rely on appear to depend on the level of institutional support they receive and on their ability and desire to accept donations and underwriting or to engage in fundraising.
- Only three of the sample stations accept underwriting from local businesses. One of these stations receives approximately \$3,000 in annual underwriting revenues, one receives approximately \$12,000, and the third receives between \$120,000 and \$130,000 in underwriting revenues. In addition, the local businesses that underwrite the sample stations reportedly tend to be too small to purchase advertising from commercial stations.
- Only one of the sample stations has measurable ratings. Because none of the other stations appears in the Arbitron ratings or has access to ratings reports, the managers of those stations generally do not know the size of their audiences. The stations have a wide range of population reaches, ranging from about 1,600 to 40,000 people, according to BIA data.
- The staff sizes of the sample stations differ greatly, ranging from a station essentially run by one person up to larger operations with five to seven managers and 30 program hosts. Most of the staffers are part-time volunteers, and only one station has a full-time paid employee.
- The sample stations tend to provide a variety of programming throughout their schedules, including music, talk, and news, as opposed to offering a single format. In addition, several of the stations rely heavily on syndicated programming, while some provide little or none. Six of the eight stations air some syndicated programming, and for two stations, such programming constitutes the large majority of their schedules.
- The station managers generally do not believe that they are competing with specific full-service stations for audience. A number of the station managers stated that they are competing for audience in a limited way with full-service stations, in the sense that some listeners who tune in to their LPFM stations otherwise might be listening to full-service stations. However, only one

station manager stated that she believes the station directly competes with a particular full-service station.

- Most of the stations believe that the restrictions on their operating power significantly reduce their potential listenership by limiting the size of their coverage areas and by creating reception problems within their coverage areas. In fact, the most frequent problem cited by the stations during the interviews was power limitations.

I. Sample Selection

4. A sample of eight stations was chosen to participate in the case studies. These stations were not chosen using a probability sampling methodology to generate a statistically representative sample.⁵ Instead, they were chosen to gain significant information about the major types of LPFM stations that were identified from the Commission's Consolidated Database System ("CDBS") and BIA databases.

5. The eight stations in the sample were chosen to represent the different types of LPFM stations and the different sizes and locations of markets within which they operate. From an examination of the CDBS and BIA databases, we identified five major types of licensees that appear most frequently among LPFM stations: religious stations, community stations, stations run by educational institutions, stations operated by state and local government agencies, and music stations.⁶ Based on the apparent distribution of these station types in the database, we selected three religious stations, two community stations, one educational, one government, and one music station.⁷ We included more religious and community stations in the sample because of their greater number in the overall population of LPFM stations.

6. We also attempted to achieve an even distribution of large, medium, and small/rural markets, as defined by Arbitron's market definitions and rankings.⁸ Two large market, three medium market, and three small (non-Arbitron) market stations were selected. The sample was skewed toward

⁵ Typical examples of probability sampling methodologies are simple random sampling, stratified random sampling, and cluster sampling. These methodologies can be used to generate sample statistics that are representative of the population. SHARON L. LOHR, *SAMPLING: DESIGN AND ANALYSIS* 23-24 (1999). Probability sampling was not used for our case studies because: (1) information describing the licensee type of each LPFM station is not available on a systematic basis; (2) the sample size is too small to yield reliable statistics; and (3) our goal was to gain in-depth information about typical stations of every major type. The deliberate choice of "typical" observations within categories is a form of purposive sampling. Purposive (or purposeful or judgment) sampling is non-probability sampling used in qualitative and mixed methods research. "Purposeful sampling focuses on selecting information-rich cases whose study will illuminate the questions under study." M. Q. PATTON, *QUALITATIVE EVALUATION AND RESEARCH METHODS* 230 (2002); LOHR at 8. Because the stations were chosen within each category at random (after screening), the sample is similar to a stratified random sample.

⁶ We selected these station types because of their higher frequency in the population of LPFM stations and because of their likely differences in characteristics and behavior. However, there may be other types of LPFM stations that are not covered by these five categories. In addition, we note that "community station" is a broad term that may include many different kinds of stations.

⁷ The CDBS and BIA databases do not include information about the licensee type, and thus stations chosen for the sample were classified by Media Bureau staff according to their apparent licensee type from the licensee name (church, government agency, school, community center, etc.) and reported format (religious, music, variety, etc.), as well as information available on the Internet about the station and licensee. We are not aware of any database that identifies the type of every LPFM station, so statistics on the relative numbers of such stations in the LPFM industry are not available, making it difficult to employ a random sampling scheme stratified by type.

⁸ "Large" markets were defined as Arbitron Metros 1-100. "Medium" markets were defined as Arbitron Metros 101-290. "Small" or "rural" or "non-market" stations were defined as being located outside Arbitron Metros.

smaller markets because the majority of LPFM stations are located in such markets.⁹ In addition, we sought geographic diversity by including stations from the Eastern, Southern, Midwestern and Western parts of the United States. For each sampling category, one station was selected at random from our list of LPFM stations, after examination for suitability with respect to each category.¹⁰ Table 1 lists the eight licensees selected for the case studies, including the sampling categories.

7. Our sampling methods have some inherent limitations. The small sample size limits our ability to confidently extrapolate our results to the general LPFM population. The non-probability sampling methodology used also undercounts, relative to the whole population of LPFM stations, certain types of stations, including stations without websites, religious stations, small market (outside Arbitron Metro) stations, and stations that have gone silent. The sample is not designed to be statistically representative of the entire LPFM industry. Because of these limitations, and the small sample size, we do not rely on aggregate statistics for our sample. In addition, we were not able to document the difficulties that have caused some LPFM stations to go silent, since all of the stations in our sample were well-established and operating when the case studies were conducted.¹¹

II. Survey Technique

8. For each LPFM station in our sample, we obtained data on its service area, format, and ratings (if any) from the Commission's internal databases, BIA, and Arbitron. In addition, we conducted a detailed interview with a manager at each station.

9. Each of the interviews was based on a list of written survey questions. As an initial step, we sent a letter to each station manager notifying him or her that the station had been selected to participate in the survey and enclosing a copy of the survey questions. The survey asked a number of questions regarding the station's structure, goals, and operations.¹² We then conducted an interview with each station manager by phone that lasted one to one and a half hours.¹³ After the interview, we sent a written summary of the station manager's answers to the station for approval and editing, as appropriate. We determined that phone interviews were preferable to written submissions for the following reasons: (1) an interview using the process described would impose the least burden on the stations; (2) an interview would result in more accurate responses because it allowed Bureau staff to explain and clarify the questions as needed; and (3) an interview allowed Bureau staff to tailor the questions to a particular station's situation and to ask follow-up questions as needed.

⁹ Even though most of the U.S. population lives in the large markets, most LPFM stations are in the smaller markets. Slightly more than half of LPFM stations are located outside of Arbitron Metros, which account for only 15 percent of the U.S. population, while 20 percent of the LPFM stations are in the top 100 Arbitron Metros, which account for 69 percent of the U.S. population. *See* Appendix A.1.

¹⁰ We examined stations for evidence that they fit a particular sampling category and that they are currently operating. In addition to verifying whether or not a station was listed in CDBS as licensed and operating, we also confirmed that each station has an operating website or that other references to its operations were available on the Internet. Some stations may go off the air and not notify the Commission of their change in status, contrary to Commission rules. We established a preference in favor of examining stations with an active website, which ensures that a station is operating and provides a resource for background information. Note, however, that not every station in the sample had its own website (*e.g.*, WGHF-LP did not have a website at the time we conducted the case studies). The sources for information about each station that were examined include the station's website (if any), CDBS, BIA, Wikipedia, and radio-locator.com.

¹¹ As of October 6, 2011, 55 LPFM stations have had their licenses cancelled, according to CDBS.

¹² The survey was divided into eight sections: (1) Status, (2) Licensee, (3) Goals of the station, (4) Format and target audience, (5) Website, (6) Staffing, (7) Financing, and (8) Operational issues. *See* Exhibit 1.

¹³ All of the interviews were conducted in July 2011.

10. A copy of the survey used for the interviews is provided at Exhibit 1. These questions generally cover the status, goals, format, financing, staffing, website use, and operational issues and difficulties for each of the stations. More specifically, the survey questions were designed to get information about each station in the following areas: (1) the identity of the licensee and the reason the station was created; (2) the station's current broadcast status and how many hours it broadcasts per week; (3) the power and reach of the station; (4) the format of the station's programming and its target audience; (5) the goals of the station and the services provided; (6) the station's use of a website; (7) the station's staffing; (8) the costs and revenues of the station and whether it accepts underwriting/sponsorships and acknowledges them on the air; and (9) any operational difficulties the station faces. The questions also sought information on the extent to which these stations are potentially competing with full-service commercial FM stations for listeners and sponsors and the factors affecting their ability and desire to do so. To this end, we asked each station manager if he or she believes the station is competing with other local stations for audience and sponsors, and if so, with which stations.

III. Overview of Individual Survey Results

11. In this section we summarize the results of our survey for each station. The list of stations and some key information about each station are provided in Table 1, while the survey answers are summarized in Tables 2 and 3.

Table 1
Basic Information about Case Studies Sample LPFM Stations

LPFM Station	Sampling Category	Arbitron Metro	Mkt Rank	City of License	ST	Licensee	Year on Air	FCC ID No.
WLGS-LP	Religious 1 – Large Market	Chicago, IL	3	Lake Villa	IL	Calvary Chapel of Lake Villa	2005	126664
WGHF-LP	Religious 2 - Medium Market	Duluth-Superior, MN-WI	213	Superior	WI	Superior Seventh-Day Adventist Church	2005	132409
KPJN-LP	Religious 3 – Small Market	None	None	Marshall	AR	St Therese Missionary Society	2005	135445
KESW-LP	Government	None	None	Whitehall	MT	Jefferson County Disaster & Emergency	2004	134811
WXSU-LP	School	Salisbury-Ocean City, MD	141	Salisbury	MD	Salisbury University	2005	124825
WUVS-LP	Community 1	Muskegon, MI	235	Muskegon	MI	West Michigan Community Help Network	2002	125796
KMEC-LP	Community 2	None	None	Ukiah	CA	Mendocino Environmental Center	2005	124562
KWSS-LP	Music	Phoenix, AZ	15	Scottsdale	AZ	Scottsdale Italian Social Club	2006	134485

Sources: All information from BIA, except the Sampling Category, which was assigned by Media Bureau staff, and the Year on Air data, which are from the Commission's CDBS database. Stations were assigned to Arbitron Metros by Arbitron. Market rank is from BIA's reported ranking of 290 Arbitron Metros, as of Fall 2010. Stations with no market or market rank listed are not in an Arbitron Metro.

12. **WLGS-LP:** WLGS-LP was chosen to represent the sampling category of large market religious station.¹⁴ It is located in Lake Villa, Illinois, which is a rural area within the Chicago Arbitron Metro. It is licensed to the Calvary Chapel of Lake Villa and operated by the pastor and assistant pastor

¹⁴ Except as otherwise noted, all of the information provided in the descriptions was obtained from the interviews Commission staff conducted with each station manager.

of the church. It has a staff of three people, two of whom are paid by the church. The station has an annual budget of \$5,000, financed by support from the church, as well as approximately \$2,000 in donations. WLGS-LP is on the air continuously 24 hours per day, seven days per week. The station has a limited website presence and does not stream its programming over the Internet.

13. WLGS-LP broadcasts religious music, Christian teaching, and religious services. All of its programming is local. As the pastor of the church explained during our interview with the station, the station's goal is to teach the message of the Bible and to air alternative Christian music not found on other stations in order to attract young people to the station. The services it provides to the community include airing Christian teaching and promoting the teaching style of the Calvary Chapel; providing a wide playlist of alternative Christian music not found on other stations; and airing Public Service Announcements ("PSAs") for local churches and local organizations, such as information about a local food pantry and a teen pregnancy center.

14. **WGHF-LP:** WGHF-LP was chosen to represent the sampling category of medium-sized market religious station. It is located in Superior, Wisconsin, in the Duluth-Superior Arbitron Metro. The station is licensed to the Superior Seventh-Day Adventist Church and is operated by Superior Community Broadcasting, Inc. The station manager does not hold a position in the church. WGHF-LP has a staff of six people, all unpaid, three of whom work regularly at the station. The station has an annual operating budget of \$8,000, which is financed entirely by donations from members of the church board of directors, listeners, and church members. It operates continuously, 24 hours per day, seven days per week. The station does not have a website and does not stream its programming over the Internet, but the network it carries, the 3 Angels Broadcasting Network, does offer streaming.

15. WGHF-LP provides talk and Christian music designed to appeal to a broad range of people. The station's goal is to offer spiritual, educational, and healthy-living programming to the community, particularly to people with physical or mental health problems. According to the station manager, the station is located in an economically depressed area that has been in decline for a long time, where many residents have mental and physical health issues. Approximately 80 percent of the station's programming is syndicated network programming from the 3 Angels Broadcasting Network. This network was chosen by the station because its programming provides help and information on health issues. In addition, the station airs hourly PSAs with a phone number for a free and confidential spiritual and personal counseling service that is provided by a team of pastoral volunteers.

16. **KPJN-LP:** KPJN-LP was chosen to represent the sampling category of small market religious station. It is located in Marshall, Arkansas, and is not in an Arbitron Metro. The station's coverage area population of 1,598 is the smallest of the stations in the sample. It is licensed to the St. Therese Missionary Society, which is a non-profit charity.¹⁵ The station is run by one person on a part-time, unpaid basis. A few other individuals occasionally help with technical problems and operate the station when the manager is unavailable. The station has an annual operating budget of approximately \$1,200 to \$2,000,¹⁶ which is financed entirely by donations from listeners and supporters. It operates eight to 11 hours per day Monday through Friday and six hours on Saturday. The station has a limited website presence and does not stream its programming over the Internet.

17. KPJN-LP provides Catholic programming and music as well as weather reports. The goals of the station are to evangelize and provide missionary outreach; teach the Bible and the Catechism of the Catholic Church; inform residents of local church masses and activities; and provide educational programs for Catholic families. According to the station manager, the station is located in a rural area in Arkansas that is mostly Protestant and in a county in which there are no Catholic churches and no other

¹⁵ Unlike the other religious stations, KPJN-LP is not closely tied to a particular church.

¹⁶ The manager of KPJN-LP did not report a total budget during our interview, so we use his estimates of the station revenues, which cover the station's costs, to estimate the station's budget.

stations providing Catholic programming. The station's programming includes prayers, Catholic apologetics, and Catholic Mass services, and it provides detailed weather information every hour. Just under half of the station's programming is syndicated network programming from Eternal Word Television Network ("EWTN") Catholic Radio, which provides Catholic talk programming. All the music aired by the station is from the manager's private collection and includes, among other things, a selection of Catholic music, Gregorian chants, classical music, polyphony, and world music.

18. **KESW-LP:** KESW-LP was chosen to represent the sampling category of government-owned station. It is located in Whitehall, Montana, and is not in an Arbitron Metro. The station is licensed to the county agency Jefferson County Disaster and Emergency Services ("JCDES"), which owns a total of seven LPFM stations.¹⁷ While KESW-LP has a coverage area population of only 1,694, the seven JCDES stations collectively cover most of Jefferson County, Montana, or 9,615 people. The station has a staff of three, all of whom are paid and part-time. The station manager is a part-time employee of Jefferson County, while the other two staffers are contractors hired to maintain the seven JCDES stations. The JCDES network has an annual operating budget of \$57,300 for all seven stations, which is funded by grants from the Federal Emergency Management Agency ("FEMA") and by the county. The network operates continuously, 24 hours per day, seven days per week. It has no website and does not stream its programming over the Internet.

19. The JCDES network was created to warn residents about weather and other local emergencies, such as storms, blizzards, flooding, and wildfires, and to provide information about road closures. When alerts are in effect, which reportedly occurs more frequently during the winter, announcements are broadcast on the JCDES network hourly. The JCDES stations broadcast music purchased from Muzak for the large majority of their schedules. With respect to music format, the network has been divided into two parts. Two of the stations, including KESW-LP, play rock and roll music, while the other stations play "old country" music. These formats were chosen because of their local appeal and the lack of alternative sources for them. The network also carries broadcasts of local events such as high-school football and basketball games, but local groups, and not JCDES, arrange these broadcasts and finance them through underwriting and donations from the local sports booster club, which are kept in a separate account.¹⁸

20. **WXSU-LP:** WXSU-LP was chosen to represent the sampling category of educational institution-owned station. The station is located in Salisbury, Maryland, in the medium-sized Arbitron Metro of Salisbury-Ocean City, Maryland. The station is licensed to Salisbury University. It has a staff of seven managers, two faculty advisors, and 30 DJs and program hosts, all of whom work part-time at the station. The managers are paid employees, while the rest of the staffers are volunteers. The station has an annual operating budget of about \$13,000, which is provided entirely by the university. The station operates continuously, 24 hours per day, seven days per week during the school year and shuts down for the summer. It has an extensive website, but does not stream its programming over the Internet.

21. WXSU-LP provides a mix of student talk shows and music. According to the current station manager, the goal of the station is to provide students, and especially communications majors, with the opportunity to learn about broadcasting. The station's target audience is the local college students. All of the programming provided is based on student interests and includes a variety of talk programming, such as sports, a show about video games, and entertainment news, as well as a wide range of music. Students choose the music and content for the shows that they host or DJ and have the ability to propose new shows. The station also provides news, which is produced by students, three times per day. All of the station's programming is locally produced.

¹⁷ Under the Commission's rules, government agencies with a public safety purpose are permitted to own multiple LPFM stations. See 47 C.F.R. § 73.855.

¹⁸ Information about the cost of these events to the local sports booster club was not disclosed by the station manager during our case study interview.

22. **WUVS-LP:** WUVS-LP was chosen to represent the sampling category of community station. It is located in Muskegon, Michigan in the medium-sized Arbitron Metro of Muskegon, Michigan. The station has a coverage area population of 28,009. It is licensed to the West Michigan Community Help Network (“WMCHN”). The station has a staff of one full-time manager and 19 part-time employees, five of whom have paid positions at the station. According to the station manager, the station’s annual operating budget of \$120,000 to \$130,000 covers the expenses of both the station and the other operations of the WMCHN. In addition to owning and operating WUVS-LP, the WMCHN also provides extensive community outreach programs, including an anti-gang initiative that sponsors live appearances in schools and community centers. The WMCHN is financed 90 percent by underwriting and 10 percent by donations. The station operates continuously, 24 hours per day, seven days per week. It has an extensive website and streams its programming over the Internet.

23. Unlike the other sample stations, WUVS-LP receives ratings reports and has substantial ratings. According to the station manager, 14,000 people receive the station’s broadcasts. Arbitron reports that, for the Fall 2009 reporting period, WUVS-LP had a 3.3 percent share of people 12 and older in its market, an average listenership of 600 people per quarter hour for the full week, and a cume listenership (the number of people who listened to the station at some point during Fall 2009) of 11,300.¹⁹

24. WUVS-LP provides a wide mix of music and talk programming. The goal of the station is to educate and empower the community by providing services to inner-city minorities. According to the station manager, 70 percent of the households in the station’s coverage area fall into this demographic. The services the station offers include providing information to the community; giving government officials airtime; running a mentorship program that enables high-risk kids to work at the station; helping local residents get training in radio; providing talk and music shows for different demographics, including young and older people and women; and airing locally-based programming. A quarter of the station’s programming is locally-produced talk and music, including a show hosted by a local judge. The music aired includes hip-hop, blues, gospel, and jazz. WUVS-LP also provides extensive local news reporting and has its own beat reporter who covers the schools and county council meetings. In addition, the station airs nine hours per week of syndicated news and music programming from American Urban Radio Networks.

25. **KMEC-LP:** KMEC-LP was chosen to represent the sampling category of community station. The station is located in Ukiah, California and is not in an Arbitron Metro. It is licensed to the Mendocino Environmental Center. The station has a staff of five administrators and 15 to 20 programmers, all of whom work at the station part-time and only one of whom is paid. Its annual operating budget is \$15,000. The majority of the station’s funding comes from fundraising and donations, and a relatively small amount from underwriting. The station reports that it earns approximately \$3,000 per year in underwriting revenues. It operates continuously 24 hours per day, seven days per week. It has an extensive website and streams its programming online. The programming director reports that about 15 percent of the local population is listening to KMEC-LP at any given time.²⁰ The station has a coverage area population of 19,407, and the programming director believes it can reach as many as 30,000 people.

26. KMEC-LP provides a wide variety of programming, including talk, information, news, music, and even old radio serials. The goals of the station are to support the mission of the Mendocino Environmental Center by providing information on environmental issues; to provide a means for people to discuss issues affecting their community; and to serve as a link between the diverse segments of the local community. The station provides many locally-produced programs, including talk, information, news, music, and coverage of local events and County Board meetings. The station also provides community access to the airwaves by encouraging local residents to visit the station and propose new

¹⁹ Fall 2009 Arbitron data. Full week ratings are provided from 6 a.m. to midnight Monday through Sunday.

²⁰ No ratings information is available from Arbitron about KMEC-LP.

shows. Approximately 40 percent of the station's programming is syndicated by the Pacifica Radio network and other network programmers, which provide the station with news and talk programming.

27. **KWSS-LP:** KWSS-LP was chosen to represent the sampling category of music station. It is located in Scottsdale, Arizona, in the large Arbitron Metro of Phoenix, Arizona. According to BIA, the station has the largest coverage area population in the sample, with a total of 40,323 people. It is licensed to the Scottsdale Italian Social Club. KWSS-LP has a staff of between nine and 11 people, all of whom are part-time and two of whom are paid. KWSS-LP's annual operating budget is \$13,000, 95 percent of which is covered by underwriting from small local businesses and the rest of which is covered by donations. The station operates continuously 24 hours per day, seven days per week. It has an extensive website and streams its programming online.

28. KWSS-LP provides music and talk programming. Its goals are to provide unique programming, to teach broadcasting to interested residents, and to provide an outlet for presenting local issues, which the manager described as "hyperlocalism." The majority of the station's programming is comprised of local shows with talk and music. The music aired on KWSS-LP is mostly alternative rock, but it also includes indie pop and international rock. The station has a large database of music, including independent and local music, and it frequently showcases and interviews local bands. The station airs local PSAs, including requests for local organ donations. In addition, KWSS-LP provides informational programming on a variety of topics, including health and wellness, finance and money management, culinary arts, language, art, and history. Syndicated programming represents approximately 5 to 6 percent of its programming schedule, including news provided at the top of each hour and political talk shows. The station's weekday schedule includes a morning talk show, afternoon music, and a "drive-time" evening show.²¹

²¹ See KWSS Radio, <http://kwss.org/schedule.php> (visited Oct. 21, 2011).

Table 2
Information about Case Studies Sample LPFM Stations – Hours, Website, Revenue

LPFM Station	On Air Hours	Coverage Area Pop	Website	Stream Online	Approx. Annual Operating Budget ⁵	Main Sources of Revenue	Underwriting	% Revenue from Org./Don./Underw. ⁴
WLGS-LP	24/7	10,492	Limited ⁶	No	5,000	Church support, donations	No	60/40/0
WGHF-LP	24/7	11,082	No	No ¹	8,000	Donations	No	0/100/0
KPJN-LP	8-11 hrs M-F, 6 hrs Sat	1,598	Limited ⁶	No	1,600	Donations	No	0/100/0
KESW-LP	24/7	1,694 ²	No	No	8,200	Government ³	No ³	100/0/0 ³
WXSU-LP	24/7 in school year, off in summer	5,203	Yes	No	13,000	University	No	100/0/0
WUVS-LP	24/7	28,009	Yes	Yes	125,000	Underwriting	Yes	0/10/90
KMEC-LP	24/7	19,407	Yes	Yes	15,000	Fundraising, donations	Yes	0/83/17
KWSS-LP	24/7	40,323	Yes	Yes	13,000	Underwriting	Yes	0/5/95

Sources: Coverage Area Population from BIA. All other information from station interviews. 24/7 = 24 hours per day, seven days per week (continuously broadcasting).

Notes:

¹ WGHF-LP does not stream its programming online, but the network it carries (3 Angels Broadcasting Network) does.

² KESW-LP is part of a network of seven stations, which BIA reports have a total Coverage Area Population of 9,615.

³ KESW-LP has a separate account for broadcasts of local school sports, which are independently organized by the local sports booster club and separately supported by donations and underwriting.

⁴ Percentage of the station's revenue from: (1) Organizational support; (2) Donations and fundraising; and (3) Underwriting, listed separately.

⁵ For stations KPJN-LP, KESW-LP, and WXSU-LP, the average annual operating budget was estimated based on information provided during the case study interviews.

⁶ These stations have limited websites, with a single page providing some basic information, and no links to social media like Facebook. The other stations' websites provide multiple pages, with programming schedules, information about the station and staff, and links to social media.

Table 3
Information about Case Studies Sample LPFM Stations – Programming & Staff

LPFM Station	BIA Format	Reported Format	PSAs	News	% Syndicated	Staff Size	Paid Staff
WLGS-LP	Relig. Music	Religious music (Alternative Christian), Christian teaching, religious services	Yes	No	None	3 PT	None – (except 2 paid by church)
WGHF-LP	Religion	Talk and Christian music	Yes: 2/hr	No	80% from 3 Angels Broadc. Network	3-6 PT	None
KPJN-LP	Religion	Music (various), religious programming (prayers, EWTN, Catholic apologetics, services), weather	Yes: 0-1/hr	Yes: EWTN Catholic news	~50% from EWTN Global Catholic Network	1 PT, plus help to run station and fix equipment	None
KESW-LP	Variety	Music (old country, rock), weather announcements, local sports games	Yes: 0-6/hr	No	~90% from Muzak (music)	3 PT: 1 manager, 2 contractors	3 paid
WXSU-LP	Alternative	Student talk shows and wide variety of music	Yes: 2/hr 10 am - midnight	Yes: 3 times per day	None	7 managers, 2 faculty advisors, 30 DJs, all PT	7 paid managers
WUVS-LP	Urban/Educ.	25% talk and 75% music (hip-hop, blues, gospel, jazz)	Yes: 20-30/day	Yes: local news with beat reporter	5-6% from Amer. Urban Radio Networks (music, news)	1 FT, 19 PT	5 paid
KMEC-LP	Variety	Variety of formats, including talk, information, news, old radio serials, music	Yes: 3/day	Yes: 30%, mostly from synd. progr.	40% from Pacifica, other sources (news, commentary)	5 administrators, 15-20 programmers, all PT	1 PT paid
KWSS-LP	Modern Rock	Music (alternative rock, indie pop, international rock), talk	Yes: 16/day	Yes: Every hour	5-6% from various sources (news, commentary)	9-11, all PT	2 PT paid

Sources: BIA Format from BIA. All other information from station interviews. FT = Full time, PT = Part time, PSA = Public service announcement.

IV. Analysis of Survey Results

29. This section of our analysis examines the major commonalities and differences among the eight stations and summarizes the key observations we made concerning the behavior and impact of the surveyed stations on full-service commercial FM stations. Specifically, we examine and compare the information we gathered about the stations in the following categories: (A) Status, Coverage, and Location; (B) Goals and Services; (C) Programming and Audience; (D) Budget and Financing; (E) Staffing; (F) Online Offerings; (G) Operational Difficulties; and (H) Competition with Full-Service Stations for Audience and Sponsors.

A. Status, Location, and Coverage

30. Like most LPFM stations, the stations in our sample began broadcasting in the years 2004 through 2006. Only two of the stations had mutually exclusive FCC applications (*i.e.*, competing

applications from other entities): KWSS-LP and WLGS-LP.²² These two stations are the only stations in our sample located in large markets. One of the licensees, JCDES, the licensee of KESW-LP, owns multiple LPFM stations, which it is permitted to do under the Commission's rules as a government agency with a public service mission.²³ The other licensees are permitted to own only one LPFM station.

31. As explained above, the eight stations we selected for our sample are geographically distributed across the country and are located in large, medium-sized, and small markets. Based on Arbitron's Fall 2010 rankings, two of the eight stations are in large Arbitron Metros, Chicago (WLGS-LP) and Phoenix (KWSS-LP), while three are in Metros ranked 101 to 290 (WGHF-LP, WXSU-LP, WUVS-LP). Three of the stations are located outside of Arbitron Metros, which generally means they are in small markets or rural areas.²⁴

32. Almost all of the stations in our sample are operating 24 hours per day, seven days per week. KPJN-LP, which operates eight to 11 hours on Monday through Friday and six hours on Saturday, is the only exception. WXSU-LP, a college station, reportedly goes off the air for the summer and only operates during the school year. In addition, all but one of the eight stations are operating at the maximum power output allowed under the Commission's rules, based on their antenna height.²⁵ Because of the varying population densities of their locations, and the impact of terrain on their coverage areas, the populations the stations are able to reach (the Coverage Area Population), as calculated by BIA,²⁶ varies significantly. While two of the stations are able to reach fewer than 2,000 people (KPJN-LP, KESW-LP),²⁷ three others can reach more than 19,000 people (KMEC-LP, KWSS-LP, WUVS-LP), and one of these (KWSS-LP) has a reach of approximately 40,000 people. In comparison, the median and average coverage area populations for all LPFM stations are 7,700 and 13,600, respectively.²⁸ The reach of the LPFM stations in our sample is dwarfed by the coverage area population of most full-service commercial FM stations, which have a median value of 77,000 and an average of 415,000.

33. Several station managers (those of WLGS-LP, WGHF-LP, WUVS-LP, KWSS-LP) reported having significant reception problems within their coverage areas, due to a weak signal being unable to penetrate walls, interference from other stations, and occasional unfavorable weather conditions

²² The licensees of both of these stations were among three applicants competing for the LPFM license available in their markets. As reported above, 21 percent of current LPFM licenses were subject to mutually exclusive applications. See Appendix A.1.

²³ 47 C.F.R. § 73.855.

²⁴ Arbitron defines a market and provides ratings for it only if there are stations in the market willing to pay for its service. The number of markets maintained by Arbitron changes frequently because of changes in demand for Arbitron services in smaller markets. The number of Arbitron Metros reached 302 in 2008, and has since declined to 282. It is possible, however, that some more heavily populated areas might not be included in a market if no stations in the area request the service. It is unlikely, however, that this would occur in a major urban area.

²⁵ Six stations are operating at the maximum effective radiated power ("ERP") of 100 watts, while two, KMEC-LP and KWSS-LP, are at 75 watts and 13 watts, respectively. LPFM stations with antennas higher than 30 meters relative to the local terrain (measured by HAAT=Height Above Average Terrain) are permitted a lower maximum power level, which effectively limits their coverage area to a fixed range of about 3.5 miles (5.6 kilometers). See FCC, <http://transition.fcc.gov/mb/audio/lpfm/index.html> (visited Dec. 2, 2011). While KWSS-LP is operating at the maximum allowed power level for its antenna height, KMEC-LP is not.

²⁶ According to BIA, the Coverage Area Population is the "Estimated Population reached by the station's contour coverage."

²⁷ Note that one of these stations, KESW-LP, is part of a network of seven stations that collectively reaches 9,600 people.

²⁸ We note that the median Coverage Area Population for our sample of LPFM stations is 10,787 and the average is 14,726.

affecting the signal. Two stations noted that reception in homes is usually poor and that most listening occurs in cars (KWSS-LP, WGHF-LP). By contrast, several of the stations claim that they cover much larger areas than is reflected in BIA's estimates.²⁹ For example, the manager of one station (KMEC-LP) stated that the station was received by people who live outside its coverage area who drive through or work in the station's coverage area.

B. Goals and Services

34. The sample stations vary significantly in their individual goals, which appear to have a significant impact on their choice of programming, services provided, staffing, budgets, and funding. According to most of the station managers, the current goals of the stations reflect the goals of the people and institutions that licensed them. Many of the stations are closely tied to an independent institution. For example, WLGS-LP is effectively run by a church; KESW-LP is operated by a government agency; and WXSU-LP is licensed to and financed by a university.³⁰ These institutional ties help determine the goals, programming, and staffing of the stations.³¹ In many cases, these institutions also provide financial support to the stations, both in the form of monetary support and through the provision of other resources (*e.g.*, free space and use of paid personnel).

35. Although the station managers described a large number of goals in their interviews, we found that these goals fit four basic categories: (1) to provide a particular kind of programming that is important to the station licensee;³² (2) to provide community-service programming designed to help with an identified problem in the community; (3) to provide locally-originated and locally-demanded programming, in many cases regardless of the specific content; and (4) to give interested people, including students, the opportunity to learn about and participate in radio broadcasting. We note that none of the sample stations stated that maximizing revenues or listenership is among their goals. Several station managers described multiple goals in their interviews and provide different kinds of programming throughout their schedules, and thus may fit into more than one of these four categories.

36. A number of the station managers explained that providing a particular kind of programming is very important to their stations. The managers of three religious stations (WLGS-LP, WGHF-LP, KPJN-LP) all expressed a desire to provide religious music and talk that assists in the promulgation and support of their faith. These station managers stated they wanted to teach the Bible, provide Christian music not available on other stations, give religious and moral guidance, provide Christian teaching and prophecy, and air information about religious services. Other station managers in

²⁹ Many surveyed stations estimated a population reach that was considerably larger than BIA's estimate: WGHF-LP (estimating 100,000 vs. BIA's estimate of 11,082); KPJN-LP (8,000 vs. 1,598); KMEC-LP (30,000 vs. 19,407); WLGS-LP (40,000-50,000 vs. 10,492); and WXSU-LP (40,000 vs. 5,203).

³⁰ The religious stations in our sample have varying degrees of institutional ties, with WLGS-LP being run by the pastor of a church, WGHF-LP being run autonomously by the members of a local church, and KPJN-LP apparently having no ties to a particular church. Both community stations have close ties to a community center. The college station is licensed to, and financed by, the university, and the government station is managed by a government agency.

³¹ There are, however, varying degrees of control of the station imposed by the affiliated or licensing institution. The college station, for example, reports that it is permitted to control its own programming and that the university generally does not influence its programming decisions.

³² Stations with a particular religious or political orientation, or that provide a particular kind of music, are likely to fall into this category. By contrast, many other stations may not have an interest in promoting a specific kind of programming, so long as it is local or popular. Some stations, such as KMEC-LP, both provide programming that fits with their philosophy and provide access to local people by allowing them to host their own shows and to select the content for those shows.

our sample desire to provide at least some programming reflecting their philosophy, views, and concerns (KMEC-LP) or their musical taste (KWSS-LP).

37. Several station managers emphasized that they are attempting to provide a community service or to address a particular problem in their communities. The community services described include warning people about severe weather, wildfire, and other safety threats to the community (KESW-LP); helping those with health problems and depression (WGHF-LP, KWSS-LP);³³ and encouraging at-risk youth to avoid gangs (WUVS-LP). In addition, we note that all of the stations reported that they air PSAs.

38. A number of station managers expressed a strong interest in providing programming that is local in nature. For at least part of their programming schedules, these station managers indicated that they are less interested in the genre of music or particular views expressed than they are in the extent to which the programming is locally-originated or reflects local needs. One station manager described this kind of programming as “hyperlocal” (KWSS-LP), while another said its goal was to be the “voice of the entire community” and that anyone could propose a new show to the station management (KMEC-LP). Some stations provide airtime to local government officials (WUVS-LP), county government meetings (KMEC-LP), or local sports events (KESW-LP). The college station (WXSU-LP) allows student volunteers to create a show on any topic. A recent example is a student-created program on video gaming. We also note that providing local programming was a stated goal of all but the religious stations.

39. Some station managers noted that giving local people the ability to learn about, and to participate in, radio broadcasting was among the station’s key objectives. This group includes the college radio station (WXSU-LP), as well as stations desiring to provide access to local students (KWSS-LP) and local at-risk youth (WUVS-LP).

C. Programming and Audience

40. The stations in the sample provide a diverse range of programming and offer a wide variety of formats. Despite the unique characteristics of each station’s offerings and the considerable differences among them, we observed several commonalities in the stations’ programming. These commonalities include: the tendency to provide a variety of programming, as opposed to offering a single format; the offering of unique programming that is otherwise not locally available; and the offering of at least some music.

41. The majority of the LPFM stations in our sample provide a variety of programming throughout their schedules. As explained in Appendix A.1., this tendency is reflected more broadly in the LPFM industry. According to BIA, 28.2 percent of LPFM stations have a “Variety” format, compared to only 1.0 percent of full-service commercial FM stations. Moreover, 83.0 percent of all full-service commercial FM stations have a music-focused format of a single genre reported by BIA (*e.g.*, Country, Adult Contemporary), while only 12.6 percent of LPFM stations have such a format.³⁴ The stations in our sample generally provide a mix of music, talk, news, and other programming, with the mix varying depending on the type of station. For example, the religious stations typically provide syndicated and local Christian talk and teaching programming for portions of their schedules, and religious music at other times. The community stations provide a mix of local talk shows, news announcements, and music. Similarly, the music station in our sample provides a significant amount of talk and informational shows in addition to music.

42. Most of the station managers noted their intent to provide programming that differs from that of full-service stations in their area. Some of the station managers, such as KMEC-LP, KWSS-LP,

³³ WGHF-LP provides healthy living programming, and advertises its own confidential counseling service for those dealing with health issues or depression. KWSS-LP has provided PSAs for people needing local organ donations.

³⁴ See Appendix A.1.

and WUVS-LP, emphasized their airing of locally-produced programming that is not available elsewhere. The WLGS-LP station manager similarly explained that the Calvary Chapel programming that WLGS-LP provides, as well as its selection of alternative Christian music, are not available from other local stations. KPJN-LP has introduced Catholic talk, teaching, and music to an area that is heavily Baptist, reportedly providing a unique source of this programming to its community. Each of the other stations surveyed similarly reported that its program offerings are unique within its community.

43. Most of the sample LPFM station managers stated that they do not carefully target their programming to one particular demographic group, unlike many commercial stations. Half of the LPFM station managers said their target audience was everyone in the local community (WGHF-LP, KPJN-LP, KESW-LP, KMEC-LP), while two additional station managers stated that their target audience varied according to the show being aired (WUVS-LP, KWSS-LP). However, some station managers stated that their stations do aim to attract specific demographic groups. WLGS-LP targets its alternative Christian music to listeners in their twenties, while WXSU-LP targets Salisbury University's college students.³⁵ WUVS-LP targets inner city minorities of different ages, which make up the majority of the households in its listening area. In addition, several sample LPFM station managers recognized that the music played during parts of their programming schedules mostly appeals to certain groups (KWSS-LP, KESW-LP, WUVS-LP).³⁶

44. Only one of the stations in our sample (WUVS-LP) had measurable ratings at the time of the interviews.³⁷ The other station managers reported that they do not know how many listeners their station has. Instead, the stations in the sample rely on a variety of methods for gauging listener interest and getting feedback about their programming, including: phone calls (KWSS-LP, WLGS-LP, WUVS-LP, WGHF-LP, WXSU-LP, KESW-LP, KMEC-LP); emails (KWSS-LP, WUVS-LP, KESW-LP, KMEC-LP); letters (WLGS-LP, WUVS-LP, WGHF-LP); visitors to their offices (KWSS-LP, WUVS-LP, KMEC-LP); public events, such as a local fair (WGHF-LP); visitors to events with music provided by the station (WXSU-LP); word of mouth and personal encounters with listeners (WLGS-LP, KPJN-LP, KESW-LP); social media such as Facebook and Twitter (KWSS-LP, WUVS-LP, WXSU-LP, KMEC-LP); and the number of people streaming their programming, if it is available on the Internet (KWSS-LP, WUVS-LP, KMEC-LP).

45. The stations in the sample differ in the amount of local programming they provide. Some stations (KMEC-LP, WUVS-LP, KWSS-LP, WXLS-LP) provide significant amounts of local programming, including locally-hosted shows.³⁸ The stations with more local programming, such as the college station, the community stations, and the music station, also have larger staffs. These stations have staffs with about five to 10 managers and 10 to 30 disc jockeys/hosts. By contrast, the stations with the smallest staffs, including the religious stations and the government station, provide fewer locally hosted

³⁵ WLGS appears to be, in effect, the only LPFM station in our sample that consciously targets a particular demographic group in its community. WXSU-LP and WUVS-LP are providing programming that appeals to a majority of their local communities (college students for WXSU-LP, inner city minorities for WUVS-LP).

³⁶ On the other hand, according to one textbook on the radio industry, program directors at commercial stations pay significant attention to audience and marketing research, and carefully research the optimal schedule and song selection to maximize their audience. MICHAEL C. KEITH, *THE RADIO STATION: BROADCAST, SATELLITE, & INTERNET* ch. 3 (Elsevier Inc. 7th ed.) (2007).

³⁷ Arbitron does not report ratings for stations outside of Arbitron Metros, or for stations whose ratings were too low to qualify. Only one station in our sample, WUVS-LP, had measurable ratings in Fall 2009. It had a rating of 0.4, a share of 3.3, and estimated average listenership of 600 people, according to Arbitron data.

³⁸ Some station managers appear to consider the playing of music, by a host or using the "auto DJ," as local programming, while others do not. This difference makes it difficult to compare the stations' answers regarding the proportion of their programming that is local. Our focus here will be on locally-hosted shows, which play music and/or provide talk and information.

shows and rely more heavily on syndicated programming and “auto DJ” music. One station manager (KWSS-LP) pointed out that locally hosted programming is readily available but more difficult to refine and make appealing to listeners. Many of the station managers stated that they are open to providing more locally hosted shows and remote on-site programming (*i.e.*, programming broadcast from remote locations using mobile broadcast equipment and a local on-air person), but they lack the staff/volunteers and budget needed to provide such programming.

46. The stations also differ considerably in the amount of news programming they provide. The community stations appear to place the greatest emphasis on providing news. One of these stations (WUVS-LP) has its own beat reporter covering local government meetings, while the other (KMEC-LP) stated that news comprises approximately 30 percent of its schedule. The music and educational stations also provided a limited amount of news during the day, often on the hour. The religious and government stations reported that they do not provide news, although two of them (KPJN-LP, KESW-LP) provide weather reports. As noted above, these stations have the smallest staffs of the stations participating in our survey.

47. All of the stations we surveyed rely to a significant extent on music to fill their schedules. Each of the station managers explained in detail why they had chosen the particular music genres aired on their stations, how this music fits into the mission of the station, and how it differs from the music played by local full-service radio stations. Several station managers stated that they play music that appeals to their target demographics and is unique to the area.³⁹ KWSS-LP reported that it chose its music genre of alternative rock, with many local and independent artists, because this format was not offered by other stations in the Phoenix area. The station regularly reviews its playlist and removes songs frequently played on other local stations. WLGS-LP plays alternative Christian music to appeal to young adults and attract them away from secular stations. The JCDES stations chose their music based on local appeal. In addition, many station managers discussed their deep playlists.⁴⁰ According to the station managers, WLGS-LP has 1,500 songs in its playlist; WGHF-LP has 3,000 songs; WXSU-LP has 2,000 songs; and KMEC-LP has 10,000 songs.⁴¹ As one station manager (WLGS-LP) noted, his playlist of 1,500 songs is much larger than is recommended for a commercial radio station.⁴²

48. The majority of the sample stations air at least some syndicated programming. This programming is wide-ranging, including news, talk, health education, religious talk and teaching, and music. Two of the stations (WGHF-LP, KESW-LP) rely on syndicated programming for most of their schedules. Two other stations (KPJN-LP, KMEC-LP) air it for 40 to 50 percent of their schedules, while two stations (WUVS-LP, KWSS-LP) use syndicated shows sparingly, to cover approximately 5 percent of their schedules. Two of the stations (WXSU-LP, WLGS-LP) air no syndicated programming. It appears that none of the stations in our sample were established solely for the purpose of airing a particular syndicated network’s programming. In addition, the station managers reported that, in each case, the stations have carefully chosen syndicated programming in order to provide programming that

³⁹ For a few stations (such as KPJN-LP), it appears that the music the stations play is music they have available in their personal collections and that the station manager personally likes, in part because of these station’s limited resources, and the lack of feedback from listeners.

⁴⁰ All of the stations except KESW-LP (which relies on Muzak for its musical programming) use a computer-based “auto DJ” to automatically and randomly select music from the station’s playlist.

⁴¹ KWSS-LP also reportedly has a very large playlist of alternative rock music.

⁴² This manager reports that he was informed that the “rule of thumb” is 150 songs for a playlist. According to a textbook on commercial radio, rock stations are characterized as having a “large airplay library” of 300 to 700 songs. KEITH at 96.

the station could not otherwise provide and that fits into the mission of the station.⁴³ Some stations report that they selectively air only those syndicated programs that they have found to be popular or effective.⁴⁴ In addition, all of the stations receive their syndicated programming for free, with the exception of the government station KESW-LP, which airs music from Muzak.

D. Budget and Financing

49. With two exceptions, the annual operating budgets for the sample stations range from \$5,000 to \$15,000.⁴⁵ The exceptions are KPJN-LP, which has an annual budget of approximately \$1,200 to \$2,000,⁴⁶ and WUVS-LP, which has an annual budget of \$120,000 to \$130,000, by far the largest in our sample. As noted above, however, the budget reported by WUVS-LP funds not only the radio station, but also the other non-profit ventures owned by the station's parent company. The median annual budget of all eight stations is \$10,600. The three religious stations in our sample have the smallest annual budgets, ranging from \$1,600 to \$8,000, while those of the community stations (except for WUVS-LP) and music stations range from \$13,000 to \$15,000. In comparison, the budgets for full-service commercial stations are generally much larger. For example, BIA reports that the median annual revenue for a full-service FM commercial station was \$723,000 for the full year 2010, which is about 70 times larger than the typical budget reported by the sample stations of approximately \$10,000 and six times larger than WUVS-LP's budget.⁴⁷

50. The sources of funding reported by the stations in our sample fall into three general categories: (1) organizational support from a sponsoring organization or government agency; (2) donations, membership dues, and revenues from other fundraising activities such as merchandise sales; and (3) underwriting from local businesses. Three of the sample stations reported that they rely mostly on organizational support: WLGS-LP, which receives all of its funding from its associated church and church fellowship;⁴⁸ KESW-LP, which relies on funding from FEMA and Jefferson County, Montana to pay all of its operating expenses; and WXSU-LP, which receives all of its funding from Salisbury University. Three stations, WGHF-LP, KPJN-LP, and KMEC-LP, rely primarily on donations and fundraising events.

51. Notably, only three of the sample stations accept underwriting from local businesses. One of these stations receives approximately \$3,000 in annual underwriting revenues (KMEC-LP); one receives approximately \$12,000 (KWSS-LP); and the third receives between \$120,000 and \$130,000 (WUVS-LP). Notably, only two of the stations in our sample, KWSS-LP and WUVS-LP, reported that they rely on underwriting to fund the majority of their operating costs. Underwriting provides

⁴³ WGHF-LP offers syndicated programming that addresses health issues, which is a community need identified by the station. KESW-LP uses Muzak that is popular in its area, while KPJN-LP airs Catholic programming as part of its mission to evangelize and to serve Catholics in its area.

⁴⁴ The manager of WUVS-LP stated that he has turned down offers to air more syndicated programming. KPJN-LP only airs the programming from EWTN that the manager believes is useful and popular.

⁴⁵ The budget of station KESW-LP was calculated by dividing the total annual budget for the seven JCDES stations of \$57,000 by the seven stations maintained by JCDES. The budget does not include the cost of broadcasting live events, such as high-school sports, which is supported separately by the local boosters club.

⁴⁶ KPJN-LP did not report its budget during its interview; however, it did report that its annual revenue was between \$1,200 and \$2,000, and that these revenues cover its annual expenses. We have used the average of this range, or \$1,600, to approximate its annual budget.

⁴⁷ See Appendix A.1. According to data from BIA for 2010, the average full-service commercial FM station's revenue is \$2 million, which is approximately 200 times larger than the typical LPFM budget. The largest revenue for a full-service commercial FM station is \$57 million.

⁴⁸ The church also pays the salaries of the pastor and assistant pastor, who operate the station.

approximately 95 percent of the funding for station KWSS-LP and approximately 90 percent of the funding for station WUVS-LP and the other non-profit enterprises owned and operated by its parent company. At the time the case study interviews were conducted, four of the stations in our sample (KPJN-LP, WGHF-LP, WLGS-LP, and WXSU-LP) did not receive any underwriting support.⁴⁹ In addition, station KMEC-LP reported that underwriting revenues cover approximately 17 percent of its operating costs. The music and community stations in our sample generally reported that they actively pursue underwriting. Several stations expressed an interest in either initiating (WXSU-LP) or increasing (WUVS-LP, KWSS-LP) underwriting support. On the other hand, none of the religious stations in our sample accepted or sought out underwriting at the time of the case study interviews. A number of station managers (including those of stations WLGS-LP, WGHF-LP, WUVS-LP, KWSS-LP) mentioned or expressed concern about the complexity of and difficulty of complying with the Commission's rules governing underwriting.⁵⁰

52. Those stations that receive underwriting funds reported that the vast majority of their underwriting support is provided by small, local businesses and services (*e.g.*, doctors, lawyers, restaurants, a tattoo shop, and a vineyard). Several stations noted during their interviews that the vast majority, if not all, of their underwriters would not be able to afford to advertise on local full-service commercial FM stations. One station (WUVS-LP) reported, however, that it receives significant amounts of underwriting from local branches and distributors of large corporations (*e.g.*, distributors of breweries and other beverage companies).

53. The most common costs cited by the stations in our sample were: (1) equipment maintenance and replacement;⁵¹ (2) music licensing fees charged by ASCAP, BMI, and SESAC;⁵² (3) a variety of operational expenses, including electricity, rent, security, and insurance; and (4) employee salaries. Not all of the stations incur each of these expenses.

E. Staffing

54. Significant differences exist in the staffing of the sample LPFM radio stations. Four of the stations (the three religious stations and the government station) have staffs of one to six people. The other four stations have much larger staffs, ranging from nine to about 40 people. The stations with the largest staffs have multiple managers or administrators, many of them paid, and many of them volunteer program hosts and disc jockeys.⁵³ The smaller stations generally are operated by only one manager and a few staff members. Notably, nearly all of the stations operate 24 hours per day, seven days per week.⁵⁴

55. Volunteers appear to play an important role for the LPFM stations in our sample. Some of the stations (KMEC-LP, KWSS-LP, WXSU-LP, WUVS-LP) rely on volunteers to host shows, and a number rely on volunteers to install and repair equipment and/or to assist with computer and website issues. Several of the stations expressed a need for larger staffs (KPJN-LP, WXSU-LP, KMEC-LP).

⁴⁹ In addition, as noted above, underwriting and donations support the live high-school sports broadcasts aired on station KESW-LP, but they do not support the operating expenses of the station. *See* Appendix A.2. at Section III.

⁵⁰ *See, e.g.*, Report at Section III.

⁵¹ Each of the stations is required to maintain a transmitter, an antenna, EAS equipment, and computer equipment and software. As noted below, some stations recently have repaired equipment damaged by lightning strikes.

⁵² KPJN-LP and WGHF-LP reported an annual cost of about \$700 for these licensing fees.

⁵³ Only one station (WUVS-LP) has a full-time paid manager.

⁵⁴ The one exception is KPJN-LP, which is essentially a one-man operation that is on the air for eight to 11 hours per weekday. The manager of this station receives help from several other individuals to repair equipment and operate the station when he is unavailable.

These stations noted that, among other things, additional technically-skilled staff or volunteers would enable them to expand their websites or improve the reliability of their operations.

F. Online Offerings

56. Six of the eight stations in our sample have their own websites. Four have well-developed websites that provide extensive links to further information and offer listeners the opportunity to interact with or follow the station using social media. Three of these stations (WUVS-LP, KMEC-LP, KWSS-LP) also stream their programming over the Internet.⁵⁵ As explained above, however, our sample is biased with respect to online operations. The sample was chosen to ensure that the stations were active, and the operation of an active website was a factor for inclusion in the case studies. Accordingly, the proportion of stations in the sample with websites, as well as the percentage that are streaming over the Internet, are higher than for the LPFM industry as a whole.⁵⁶

57. The four stations with well-developed websites (WXSU-LP, WUVS-LP, KMEC-LP, KWSS-LP) also reported having the largest staffs in our sample. The websites of these stations generally provide a programming schedule, information about the station, Facebook links, a means to donate money or to contact the station by email, and, in one case (KMEC-LP), archives of programming. The managers of these stations all stated that their websites are very important to their stations and that the websites provide several benefits, including helping to advertise the station to potential listeners (often through Facebook), providing information about the station's schedule, and getting feedback from the station's fans. The stations that stream their programming also indicated that they often have listeners in distant places, although the number of simultaneous streams these stations reportedly receive was relatively small (*e.g.*, up to 80 for KWSS-LP, 60 for KMEC-LP, and 50 for WUVS-LP).

58. The religious stations and the government station appear to have the least developed websites and do not stream their programming over the Internet. The managers of two of these stations (WLGS-LP, WGHF-LP) explained that they had not developed more sophisticated online operations because of a lack of the appropriate skills, scarce funds,⁵⁷ and insufficient demand in their area for Internet access and streaming.

G. Reported Operational Difficulties

59. As part of the interviews with the station managers, we asked about the major operational difficulties, if any, faced by the stations. All but one of the managers stated that the low power of the station poses a significant problem and that they would like to operate at a higher power.⁵⁸ The sole exception is KESW-LP, which belongs to a network of seven stations that covers the entire county in which it is located.⁵⁹ Several station managers (KPJN-LP, WXSU-LP, KMEC-LP) expressed a desire to

⁵⁵ In addition, WGHF-LP's syndicated programming is streamed on the website of the 3 Angels Broadcasting Network, but WGHF-LP does not stream its own signal over the Internet.

⁵⁶ As noted previously, BIA reports that only 43.5 percent of LPFM stations have websites, including stations listing syndicated network websites. *See* Appendix A.1.

⁵⁷ Streaming raises a station's costs because, as noted by the station manager of WLGS-LP, the music license fee to ASCAP/BMI/SESAC is higher if the music is streamed on the Internet.

⁵⁸ Two stations (KWSS-LP, WUVS-LP) said they would like to be able to operate at 250 watts, one of which (WUVS-LP) has petitioned the Commission for the authority to operate at this increased power level; a third station would like to operate at 200 watts (WGHF-LP), and another station (KMEC-LP) said it wants to transition to a full-service license eventually.

⁵⁹ The manager of KESW-LP explained that the seven stations that distribute the JCDES network's signal effectively cover Jefferson County, Montana, so the power limitation of 100 watts was not a problem for the licensee.

extend their coverage to a larger area. Other station managers (KWSS-LP, WGHF-LP, WUVS-LP, WLGS-LP) were concerned about problems with reception in their existing coverage areas. Some of these station managers emphasized in-home reception issues, noting that LPFM stations' signals often are unable to penetrate the walls of a home.⁶⁰ Hilly terrain reportedly causes reception problems for at least two stations in our sample (WGHF-LP, WUVS-LP). Several station managers (WLGS-LP, WGHF-LP, WUVS-LP) also expressed frustration with interference from full-service commercial FM stations, especially in unfavorable weather conditions.

60. A number of the station managers in our sample also noted equipment, and especially computer-related, problems. As several of the managers explained, radio station operations are often highly computerized, and computers are responsible for providing much of the station's programming, including music and PSAs. Computer outages, including those caused by power failures, lightning strikes, and software problems, have forced many stations (KMEC-LP, KPJN-LP, WLGS-LP, WXSU-LP) off the air temporarily. This problem was more acute for smaller stations, which often cannot afford a UPS (battery backup) to keep the computer running through power outages and must manually reboot the computer after every outage. Lightning strikes have caused problems for at least two of the stations (KPJN-LP, WUVS-LP). In addition, equipment problems and the cost of repair or replacement is an ongoing problem for a number of stations (KWSS-LP, KMEC-LP, WXSU-LP, KPJN-LP).

61. The station managers in our sample also noted a variety of other operational and legal or regulatory problems. Several stated that they need larger staffs (KPJN-LP, KMEC-LP, WXSU-LP) and noted funding shortages (KWSS-LP, WUVS-LP, KMEC-LP). The restrictions on underwriting for LPFMs were criticized by one station (WUVS-LP), and at least two (KMEC-LP, KPJN-LP) stated that the high cost of music license fees from ASCAP/BMI/SESAC was problematic.⁶¹

H. Competition with Nearby Full-Service Stations

62. The sample LPFM station managers were asked which full-service stations in their service areas, if any, have a similar format to theirs, and whether they believe that they are competing with full-service stations for listeners or underwriting/sponsorships. A number of the LPFM station managers provided names of stations with similar formats, although most noted that their programming differs in important ways from that of the local full-service stations. Many of the station managers (WLGS-LP, KPJN-LP, KMEC-LP, WXSU-LP, KESW-LP) stated that they are competing for audience in a limited way with full-service stations, in the sense that some listeners who tune in to their LPFM stations otherwise might be listening to full-service stations. However, only one station manager stated that she believes the station directly competes with a particular full-service FM station for listeners: the manager of KMEC-LP said that her station was in competition with the public radio station KZYZ(FM). All of the other station managers stated that they believe they are providing programming that is unique to their area (WGHF-LP, WLGS-LP, KWSS-LP, KPJN-LP, WUVS-LP, WXSU-LP, KESW-LP). Most of the stations stated that they do not believe they are able to compete fully with local full-service stations for a variety of reasons, including their weak signals (WGHF-LP, KMEC-LP), poor name recognition in their communities (KWSS-LP, WXSU-LP), or the rule prohibiting them, unlike full-service commercial FM stations, from conducting contests to attract listeners (WUVS-LP).

⁶⁰ One station (WGHF-LP) called for a study of the power needed to reach into people's homes because it said it could not fully serve the listeners in its coverage area.

⁶¹ These stations either would like LPFM stations to be exempt from the fees (KMEC-LP) or to obtain a prorated rate for stations with small audiences that are not broadcasting at night (KPJN-LP). Music license fees comprise the majority of KPJN-LP's annual budget. In addition, the manager of one station (KWSS-LP) complained of "paper bullying" by local full-service stations. According to the station manager, these stations routinely oppose KWSS-LP's requests to the Commission for minor modifications. Some station managers (KWSS-LP, WGHF-LP) stated that they oppose LPFM stations being secondary to full-service stations.

63. Two of the stations reported that they believe they are directly competing with full-service stations for underwriting (WUVS-LP, KMEC-LP) but that this competition is limited to specific underwriters. The managers of the three stations that currently seek underwriting (KWSS-LP, WUVS-LP, KMEC-LP) stated that most of the businesses that underwrite them are small local businesses that do not advertise on commercial stations.

Exhibit 1

FEDERAL COMMUNICATIONS COMMISSION, MEDIA BUREAU
LOW-POWER FM SURVEY
FOR
LOCAL COMMUNITY RADIO ACT OF 2010
ECONOMIC STUDY AND REPORT TO CONGRESS

June 2011

-
1. **Status:**
 - a. What is your position at the station?
 - b. What is the name of the station's General Manager?
 - c. Is your station currently on the air?
 - d. How many hours per day does the station broadcast? How many days per week does it broadcast?
 - e. How many years has the station been on the air? What year did it begin broadcasting?
 - f. What is the power level of your station? If you were allowed to provide a stronger signal, would you want to do it?
 - g. Do you know how many people or homes are able to receive the station's programming (i.e., are in its service area)?

 2. **Licensee:**
 - a. Please confirm the name of the organization that operates the station.
 - b. What kind of organization is it (e.g., church, school, government agency)?

 3. **Goals of the station:**
 - a. How would you describe the reasons why your station was created?
 - b. Does the station have a mission statement? If so, please provide us with a copy.
 - c. What service or services do you believe the station is providing to the local community?
 - d. Does your station provide any services to your community that are not provided by other radio stations? What are those services?

 4. **Format and target audience:**
 - a. What programming format (e.g., news, talk, country music, religious music) does the station provide? If there are various formats, please state each type of programming.
 - b. Why was that format chosen?
 - c. Does the station air syndicated or network programming? What programming? What percent of broadcast time is devoted to syndicated or network programming?
 - d. Does the station air any locally-produced programming? What is this programming, and how many hours does this programming air per day or per week?
 - e. Does the station air news programming? What is the source of this programming, and how many hours per day or per week does it air?
 - f. Who is the station's target audience?
 - g. Does the station air public service announcements (PSAs)? If so, how often are they broadcast and for how many different organizations?
 - h. Do you know roughly how many listeners the station has, and how do you know this?
 - i. Do you get feedback from your audience? If so, how is feedback generally provided (e.g., by phone, by letter, through the website)?
 - j. Do any full power stations in your station's service area have formats that are similar to your station's format? If so, which stations?
 - k. Do you believe that your station is competing with full power stations for listeners? Why

or why not? If so, which full power stations?

5. **Website:**
 - a. Does the station have a website? If so, what is the Internet address/URL?
 - b. Does the station stream its programming on the Internet?
 - c. How important is the website to the radio station? How many people listen to the station via the website, and/or contribute to the station through it?

6. **Staffing:**
 - a. How large is the staff of the station? How many staffers does it have?
 - b. How many of the station's staffers are paid employees?
 - c. How many of the station's staffers are full time?
 - d. What resources does the station rely on for finding staff? If your station is part of a larger organization (e.g., a school or church), do some/most/all of the station's staffers come from that organization?

7. **Financing:**
 - a. How is the station funded (e.g., organizational support, listener or member contributions, underwriting/paid sponsorships)?
 - b. Does the station solicit donations from listeners and/or members, and if so, how is this done?
 - c. How many members or listener-contributors does the station have? How would you characterize the typical contributor?
 - d. Does the station accept underwriting/paid sponsorships? If so, what proportion of its revenues comes from underwriting? How does the station solicit underwriting donations? How would you characterize the typical underwriter?
 - e. Does the station broadcast underwriting announcements? How often does it broadcast them?
 - f. Do you believe that the station is competing with full power stations in its market for underwriting/sponsorships? Why or why not?
 - g. Are you willing to tell us your station's approximate annual operating budget?
 - h. Are you willing to tell us your station's approximate annual revenues from all sources and, more specifically, its approximate annual revenues from underwriting?

8. **Operational issues:**
 - a. Did the station have operational difficulties when it first came on the air?
 - b. What are the biggest difficulties the station faces today in its operations?
 - c. Is there something the FCC could do to make operation of the station easier?

Appendix A.3. Analysis of the Likely Impact of LPFM Entry on Full-Service Commercial FM Stations

1. In this section of the Economic Study, we describe the likely impact that LPFM stations have had on full-service commercial FM stations. This section provides predictions and guidance for the statistical analyses that follow in Appendix A.4. Based on the findings we have made in other parts of our study and an analysis of the markets in which LPFM and full-service commercial FM stations participate, we find that LPFM stations are likely to have only a negligible economic impact on full-service commercial FM stations.

2. Full-service commercial FM stations participate in two interrelated markets, the market for audience and the market for advertising. They offer programming for free to potential listeners in their service area in exchange for the attention of listeners and sell a portion of this attention to advertisers. The geographic market of the audience for full-service commercial FM stations is their coverage area. In many cases, this coverage area corresponds to the Arbitron Radio Metro Market or Markets (“Arbitron Metro”) in which they have listeners, although a large number of full-service commercial FM stations are located outside of Arbitron Metros.¹ Full-service commercial FM stations compete for audience through the programming they provide. Because consumer programming preferences vary substantially, there is significant horizontal product differentiation in the radio market with full-service commercial FM stations typically specializing in a particular format of music or talk. Full-service commercial FM stations compete for advertisers in the market for advertising through the rates they charge for advertising and the size of their audience. In general, advertisers will pay more to advertise on stations with large audiences in their preferred demographics.²

3. The entry of LPFM stations could affect full-service commercial FM stations’ profits in two ways. First, the presence of LPFM stations could reduce the audience size of full-service commercial FM stations. Specifically, a radio station entrant will attract a listener away from an incumbent radio station only if two conditions exist: (1) the entrant’s signal reaches the listener and provides satisfactory reception, and (2) the programming of the entrant is preferred by the listener over that of the incumbent station. Second, LPFM stations could draw advertisers away from full-service commercial FM stations by offering underwriting announcements. Entering LPFM stations will seek audience and funding, which potentially puts them in competition with full-service commercial FM stations. Accordingly, the potential impact of LPFM stations in these two markets – audience and advertising – depends on how close a substitute the LPFM offerings are to full-service commercial FM stations’ products.

4. We believe that three important legal restrictions on LPFM stations significantly reduce the competitive threat they pose to full-service commercial FM stations in the markets for audience and advertising: (1) the requirement that LPFM stations operate at a maximum power of 100 watts;³ (2) the requirement that they operate on a non-commercial educational (“NCE”) basis;⁴ and (3) the prohibition on LPFM stations’ broadcasting of commercial advertisements or promotional announcements.⁵ Because of

¹ See Appendix A.1.

² Simon Anderson & Stephen Coate, *Market Provision of Broadcasting: A Welfare Analysis*, REV. OF ECON. STUD. 72, 947–972 (2005).

³ See 47 C.F.R. § 73.811. In addition to the class of LPFM stations authorized to operate at a maximum power of 100 watts, another class of LPFM stations is permitted to operate at a maximum power of 10 watts. See *id.*; see also *Creation of Low Power Radio Service*, Report and Order, 15 FCC Rcd 2205, 2211-12, ¶¶ 13-14 (2000). No stations currently exist in the LP10 class, however.

⁴ See 47 C.F.R. § 73.853.

⁵ See 47 C.F.R. §§ 73.801, 73.503(d).

these restrictions, we believe that LPFM offerings in both the audience and advertising markets are lower quality substitutes for the offerings of full-service commercial FM stations.

5. First, the limitations on the maximum power of LPFM stations substantially reduce the number of potential listeners they can serve and, therefore, the number of listeners they are likely to draw away from full-service commercial FM stations. The requirement that LPFM stations operate at no more than 100 watts appears to constrain their ability to gain listeners significantly. As a result of this power restriction, the reach of LPFM stations is limited to about 3.5 miles, which is substantially smaller than the reach of the median full-service commercial FM station of approximately 26 miles.⁶ Further, the median coverage area of full-service commercial FM stations is approximately 55 times larger than that for LPFM stations. The median coverage area population of full-service commercial FM stations is 10 times larger than that of LPFM stations, and the average coverage area population of full-service commercial FM stations is approximately 30 times larger than that of the average LPFM station.⁷

6. The low power of an LPFM station affects not only its geographic reach and coverage area, but also the quality of its signal and the ability of listeners to receive its signal consistently inside the station's coverage area. For example, several of the station managers interviewed for our Case Study Analysis explained that their station's signal was not able to penetrate the walls of homes sufficiently.⁸ Such indoor reception problems reduce potential LPFM listenership. As described further in the case studies, LPFM signal propagation also may be vulnerable to intermittent interference from full-service stations and changing weather conditions.⁹ In addition to reducing potential LPFM listenership within an LPFM station's coverage area, these reception problems may cause an LPFM station to be regarded as providing a lower quality signal than full-service stations. Additionally, we note that the relatively small coverage area of, and reception problems associated with, LPFM stations limit their appeal to potential underwriters.

7. Second, the fact that LPFM stations must operate on an NCE basis substantially limits the types of entities that may become LPFM licensees. The types of entities that are eligible to serve as LPFM licensees – such as churches, community organizations, public safety organizations, and educational institutions – are likely to have listenership and revenue-earning goals that are different from those of for-profit licensees. Many LPFM stations may have a limited need for underwriting because they have institutional financial support, with funding from their school, church, government agency, or other institution.¹⁰ We note in this regard that it appears that a large percentage of LPFM stations do not currently provide any underwriting announcements.¹¹ As demonstrated in other parts of the Economic Study and in the record in this proceeding, LPFM stations also tend to operate on small budgets, particularly in comparison to full-service commercial FM stations.¹²

⁶ See Appendix A.1.

⁷ See *id.*

⁸ See Appendix A.2.

⁹ See *id.*

¹⁰ See *id.*

¹¹ See Appendix A.2. (noting that only three of eight sample stations in the case study analysis accept underwriting from local businesses, with one station receiving approximately \$3,000 in annual underwriting revenues; one receiving approximately \$12,000 in annual underwriting revenues; and the third receiving between \$120,000 and \$130,000 in annual underwriting revenues); see also Report at Section IV (reporting results of 2011 Prometheus survey of LPFM stations in which most respondents reported that they rely on underwriting to fund 25 percent or less of their annual budget).

¹² See Appendix A.2. (finding that the case study sample stations had typical annual budgets of \$10,000, compared to the median full-service commercial FM station budget of \$723,000); see also Report at Section IV (reporting (continued....))

8. Third, the prohibition on airing commercial advertisements that applies to LPFM licensees restricts their ability to draw advertisers away from full-service commercial FM stations and therefore to have an impact on the market for advertising. Although LPFM stations are permitted to acknowledge contributions stemming from sponsorship or underwriting arrangements,¹³ the legal restriction on their ability to promote the products or services of their sponsors significantly reduces the incentives of sponsors to replace commercial advertisement spots on full-service commercial FM stations with underwriting announcements on LPFM stations.

9. We further find that differences between the programming of LPFM stations and full-service commercial FM stations are likely to limit substitution between the two services. Listeners of full-service commercial FM stations will switch to an LPFM station if they prefer its programming. A station can affect the popularity of its programming in two ways: (1) through the choice of format, or (2) through other investments, such as employing popular hosts, airing popular syndicated programming, and researching the preferred programming of its target audience to determine the most popular programming or songs.

10. Turning to the choice of format, we find that LPFM stations generally broadcast in formats that are very different from those of full-service commercial FM stations. As discussed in Appendix A.1., 83.0 percent of full-service commercial FM stations specialize in a Music format, compared to only 12.6 percent of LPFM stations. Further, LPFM stations are much more likely to have a Religious format than full-service commercial FM stations (49.4 percent for LPFM stations versus 5.0 percent for full-service commercial FM stations), a Miscellaneous format (32.9 percent versus 1.4 percent), or a Variety format (28.2 percent versus 1.0 percent). These differences in format likely will reduce the number of listeners LPFM stations will draw away from full-service commercial stations, and thus reduce the competitive impact LPFM entry will have on full-service commercial stations.¹⁴

11. In addition, we believe that many LPFM stations likely will have incentives to choose programming that is different from that provided by full-service commercial FM stations for two reasons. First, those LPFM stations that seek to provide a particular programming content consistent with their interests are unlikely to set up and bring a station on the air if the programming already is available from another local station. Second, LPFM stations will find it more difficult to obtain donations and institutional support if they provide programming that is duplicative of programming already provided in the market.

12. While we cannot directly compare the quality of LPFM and commercial FM stations' programming, we note that LPFM stations' budgets are much smaller than those of full-service commercial FM stations and that LPFM stations are thus less able to afford the most popular and expensive syndicated programming and show hosts. Indeed, all but one of the stations in our case studies that aired syndicated programming obtained it for free.¹⁵

13. Finally, we note that our analysis finds ample support in the current listenership data we have gathered in other parts of this Economic Study. Based on these data, it appears that LPFM stations generally have a negligible impact on full-service commercial FM stations. Few have listenership high enough to qualify for an Arbitron rating, and most have broad formats, compared to the more specialized and focused formats of full-service commercial FM stations. As shown in Appendix A.1., total

(Continued from previous page) _____
results of 2011 Prometheus survey of LPFM stations in which the average annual budget reported by respondents was \$19,402.50 and the median annual budget was \$10,000).

¹³ 47 C.F.R. §§ 73.801, 73.503(d).

¹⁴ In addition, the offering of different formats by LPFM stations may enhance consumer welfare by providing listeners with a greater variety of programming. It particularly will benefit listeners who prefer the formats offered by LPFM stations in situations where those formats are not offered by other local radio stations.

¹⁵ See Appendix A.2.

listenership to LPFM stations appears to represent less than 0.1 percent of total radio listenership in the Arbitron Metros.¹⁶ In no Arbitron Metro does LPFM stations' total market share of listenership exceed 3.5 percent.¹⁷ The small market share of LPFM stations is strikingly depicted in Figure 1.¹⁸

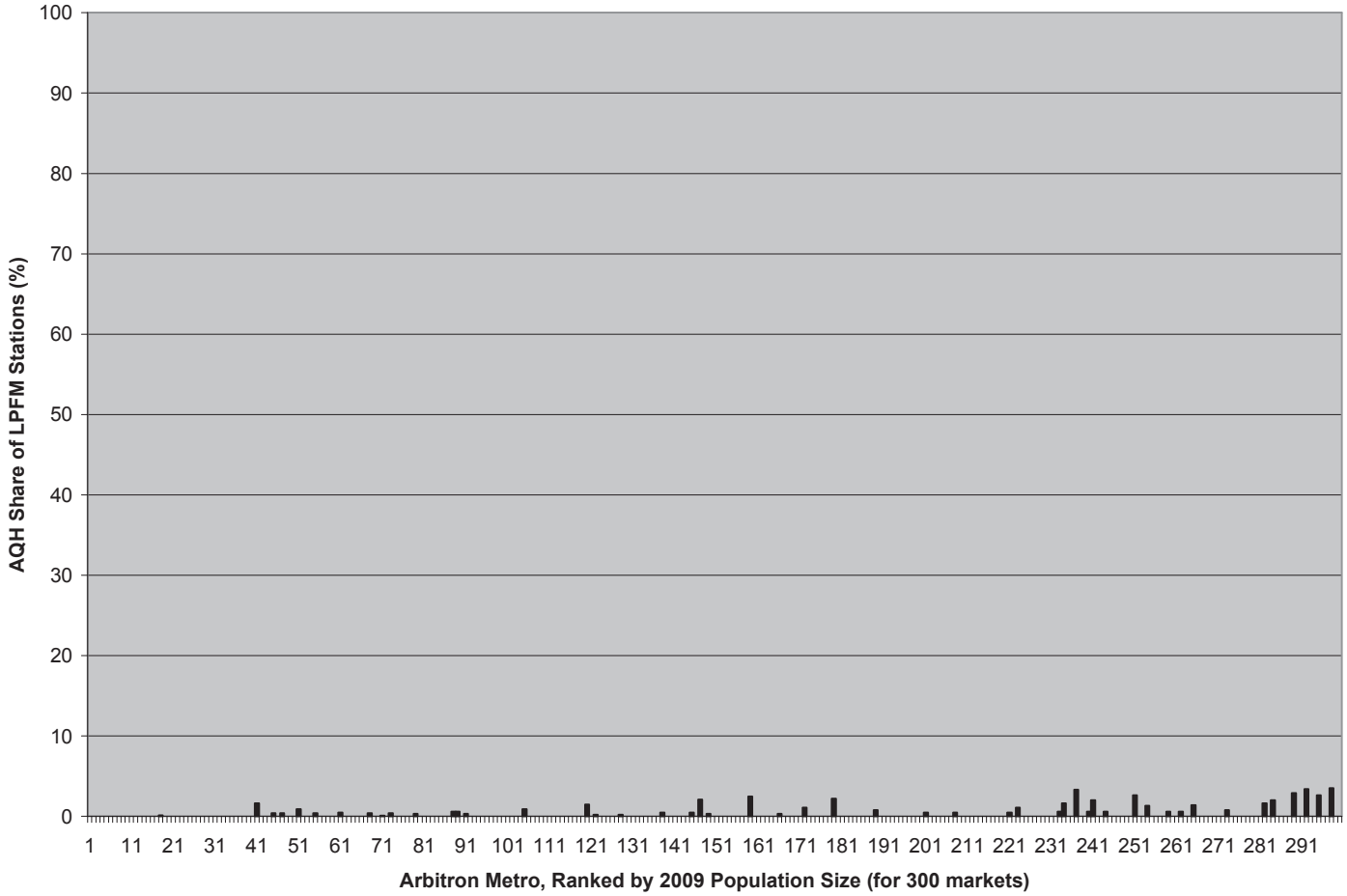
14. In the next section of the Economic Study, we employ statistical techniques that confirm the assessments set forth in this section.

¹⁶ See Appendix A.1.

¹⁷ See *id.*

¹⁸ We note, however, that there are some exceptions to these overall trends. Some LPFM stations have the goal of increasing audience, providing a format that is popular in their community, and/or obtaining significant funding from underwriting to support their operations. See Appendix A.2. As a result, it appears that a few LPFM stations may have an impact, albeit limited, on full-service commercial FM stations' audience and advertising revenues. These particular LPFM stations have substantial Arbitron ratings in their market, substantial budgets, and/or programming that is similar to that of local full-service commercial FM stations. The highest rank for an LPFM station is eighth in its market, in AQH Persons. See Appendix A.1.

Figure 1
Collective AQH Market Share of all LPFM Stations in Each Market, by Arbitron Metro



Appendix A.4. Statistical Analysis of the Economic Impact of LPFM Stations on Full-Service Commercial FM Stations

1. In this portion of the Economic Study we analyze the economic impact of LPFM stations on several performance metrics of full-service commercial FM stations during the period 2005 to 2009. We begin by describing the data used in the analysis. This is followed by our analytical framework which describes the methods to be used and appropriate interpretations and cautions associated with those methods. A simple tabular analysis then follows. This section highlights several stylized facts regarding the locations that attract LPFM stations. What becomes apparent from this section is that LPFM stations are not randomly distributed throughout the United States. Rather, the types of markets and full-service commercial FM stations they interact with differ in important respects. Following the tabular analysis, we turn to regression methods. These methods are intended to control for the non-random distribution of LPFM stations in the United States.

2. While the tabular analysis indicates that there may be some economic impacts, both positive and negative, of LPFM stations on full-service commercial FM stations, the regression analyses indicate that most of these effects are due to spurious correlation caused by the non-random distribution of LPFM stations. Most of our regression analyses find that the entry of LPFM stations into the service area of a full-service commercial FM station does not have a statistically significant economic impact on the key performance metrics of the full-service station. Although one subset of our regressions suggests that LPFM entry may have some adverse economic impact on one type of full-service FM commercial station, we believe that this limited finding is based on spurious correlation. Overall, therefore, our regression analyses provide no statistically valid evidence that LPFM stations have a measurable effect on the economic performance of the average full-service commercial FM station.

I. Data

3. Numerous data sources have been brought together to analyze the economic impact of LPFM stations on commercial FM stations. These data sources can be broadly classified as information about LPFM stations, information about commercial FM stations, and information about radio markets. We address each in turn and then discuss how these separate elements are joined into a single comprehensive dataset. The overall structure of the database is longitudinal. It contains observations on LPFM stations, commercial FM stations, and radio markets at three points in time: 12/31/2005, 12/31/2007, and 12/31/2009.

A. Information about LPFM Stations

4. We developed a list of current and former licensed LPFM stations from the FCC's Consolidated Database System ("CDBS"). Additional information obtained from CDBS included the location of the LPFM stations' antennae. This list of 903 LPFM stations was then supplemented with information available from BIA/Kelsey's Media Access Pro database. The key piece of additional information for our purposes was the dates that LPFM stations went on the air and off the air.¹ The on-air and off-air dates of stations allowed us to construct a longitudinal database encompassing 12/31/2005, 12/31/2007, and 12/31/2009.

5. With this basic set of information, we were able to identify which radio markets each LPFM station was serving. This process of assigning LPFM stations to radio markets is similar to the FCC's procedures for assigning stations to Arbitron Metros for the purposes of its media ownership limits. LPFM stations are assigned to Metros based on the location of their antennae. When a station's

¹ CDBS information was used for on-air and off-air dates for the few LPFM stations whose dates were not listed in the BIA database.

antenna is within the boundary of an Arbitron Metro, the station is considered to be serving the Metro. Stations that are not located in an Arbitron Metro are referred to as out-of-market stations even though FCC ownership rules establish a procedure for creating radio markets for proposed transactions. These procedures are based on radio station contours and have not been applied for the purposes of this study. All LPFM stations not assigned to an Arbitron Metro are classified as out-of-market. For the purposes of this study, the terms radio market and Arbitron Metro are used synonymously.

6. Arbitron Metros have two features that complicate assigning stations to them. While most Metros are defined by county boundaries, a few Metros contain only portions of one or several counties. For example, the Hamptons-Riverhead Metro consists of the eastern portion of Suffolk County, NY. We refer to this situation as a split county. The second complicating feature of Arbitron Metros is that separate Metros may share portions of the same geography. As mentioned, the Hamptons-Riverhead Metro consists of the eastern portion of Suffolk County, NY. The Nassau-Suffolk Metro consists of Nassau and Suffolk counties in New York, and therefore encompasses all of the Hampton-Riverhead Metro. And finally, the New York Metro encompasses all of Nassau and Suffolk counties in addition to a significant number of other counties. It therefore includes all of both the Nassau-Suffolk and Hampton-Riverhead Metros. We generally refer to the Nassau-Suffolk and Hampton-Riverhead Metros as “embedded” Metros since they are embedded in a larger Metro.

7. Embedded Metros are handled by following FCC procedures which assign stations to all of the radio markets in which they are physically located. Addressing split counties required a more labor intensive approach. The LPFM antennae sites located in split counties were identified on detailed maps of Arbitron market boundaries. It was then determined if the antenna was located within the portion of the county in the Metro or if the antenna was located outside the Metro. The end result of these features of Arbitron Metro geography is that LPFM stations can be considered to be in more than one market. For example, a station located in the eastern portion of Suffolk County, NY would be located in three Arbitron Metros under this procedure. When our analysis is focused on data collected at the level of a Metro we maintain this situation and analyze a single station in multiple markets as if it were a separate station in each of those markets.

B. Information on Full-Service Commercial FM Stations

8. The bulk of our information on full-service commercial FM stations was collected in support of the Commission’s 2010 Quadrennial Review of Media Ownership Rules. As part of the Review, a longitudinal database of media outlets was built using Commission and commercial databases. The database was one of the basic inputs used in the ten studies conducted in support of the Review. The database contains a wide range of information on individual radio stations as of 12/31/2005, 12/31/2007, and 12/31/2009.

9. This database was supplemented with several additional pieces of information for this study. The presence of LPFM stations in the area served by each full-service commercial FM station was calculated. Three measures of the presence of a LPFM station were calculated for each full-service commercial FM station. The market measure of LPFM presence is the number of LPFM stations in the same radio market as the full-service commercial FM station. This measure was calculated for each of the three periods. The second measure was the number of LPFM stations located within the service contour of the full-service commercial FM station. This is referred to as the contour measure of LPFM presence. Calculating this measure was slightly more complicated. The Commission does not have historic records of the service contours of full-service commercial FM stations readily available. We used the service contours of full-service commercial FM stations as of 10/1/2011.² The lack of historical data presented several problems. It is not possible to calculate the presence of LPFM stations for full-service

² Details on the service contours are available at http://transition.fcc.gov/ftp/Bureaus/MB/Databases/fm_service_contour_data/readme.html.

commercial FM stations that are no longer on the air. In addition, the estimated LPFM presence may not be accurate for full-service commercial FM stations that changed their engineering parameters in the intervening period. Even with these drawbacks, we calculated the contour measure for each of the three time periods using the LPFM stations that were on the air during the time periods. The third method of measuring the presence of LPFM stations is a combination of the contour and market measures which we call the contour/market measure. This method counts the number of LPFM stations that are within the contour of a full-service commercial FM station and that are in the same radio market as the full-service commercial FM station. Clearly this measure is a more constrained measure and will always suggest less LPFM presence, though possibly more intense, than either of the other two measures. As with the previous two measures, this is calculated for each of the three time periods in our database.

10. Similar measures of the presence of competition between full-service commercial FM stations and full-service AM and FM radio stations were constructed. The contour measure relies on the location of the full-service AM and FM station's antennae as of the same date of the contours: 10/1/2011. As such, we may undercount the presence by failing to account for stations that have stopped service in the intervening time. We do however remove stations that were not in service at each of the three measured time periods. In addition, to the extent that some stations change antenna locations, there may be some inaccuracy introduced. The contour/market method suffers from the same issue as it relies upon the recent contour and antenna location information. The market measure does not suffer from these issues.

11. The final elements of our full-service commercial FM station data are the economic performance metrics that LPFM stations may influence. We use two performance metrics: station ratings and station revenue. Our ratings data comes from the Arbitron Media Professional database.³ We match stations' rating for the Fall 2005 ratings period with our data as of 12/31/2005 and ratings from the Fall 2007 ratings period with our data as of 12/31/2007. We do not use ratings from 2009. The reason for this is that by the Fall of 2009 a significant number of markets had been transitioned to Arbitron's Personal People Meter ("PPM") system. At this time not all stations in a market were encoding their radio broadcasts with the information necessary for the PPM device to record listening behavior. Therefore we chose not to analyze these data as it was unclear if they would paint a complete picture of listening behavior in a market. Several markets were missing from the earlier years due to the introduction of PPM service in Philadelphia and Houston as well as the impact of Hurricane Katrina on a few Gulf Coast radio markets in the Fall of 2005. Our focus will be a station's average quarter hour (AQH) rating for the Monday through Sunday from 6:00am to midnight daypart. This measure represents the average number of persons at least 12 years old who reported listening to the station for a minimum of five minutes during a 15 minute period within the daypart. The rating is then expressed as a percentage of the population in the market. Accordingly, ratings can range from 0 to 100, though in practice it is unusual for the measure to exceed 10.

12. We chose this measure for several reasons. The full-week daypart will provide a broad picture of listening rather than a narrower daypart such as morning or afternoon drivetime which may constrain most listeners to certain locations or activities. We chose to focus on ratings rather than the raw count of persons, share measures, cumulative measures, or time spent listening to a station because of our belief that ratings are more closely associated with the advertising sales that generate the revenue that full-service commercial FM stations rely upon for their economic wellbeing. While Arbitron measures listening to stations regardless of whether the station is located in an Arbitron Metro, listening by persons who live outside an Arbitron Metro, but inside the Total Service Area, are less commonly reported. We restrict our analysis to the listening behavior of consumers residing inside an Arbitron Metro because this is a universally reported estimate. This leads us to remove the ratings of full-service commercial FM stations that are not in an Arbitron Metro. While some of these stations will have reported ratings, those

³ An overview of the terms and data Arbitron provides can be found at http://www.arbitron.com/radio_stations/tradeterms.htm.

ratings do not reflect the bulk of the station's audience. As such we were concerned that this could serve to bias our estimates of listener behavior. Finally, we note that some stations are not listed at all in the Arbitron database, while others may receive a rating of zero. In the former case, those stations may not have met the minimum reporting standards of Arbitron. Those standards generally consist of being entered on a minimum number of diaries as well as meeting certain minimum ratings. In addition, problems with matching our list of full-service commercial FM stations to the Arbitron data may lead to a lack of information. Stations which were not found in the Arbitron data are not analyzed from a ratings perspective. Stations that receive a rating of zero are analyzed. These are simply stations whose rating in the particular daypart is less than 0.05 and therefore rounded down to zero.

13. The other economic performance measure of full-service commercial FM stations that we use is an estimate of the station's annual revenue. BIA/Kelsey estimates the annual revenue of a significant number of radio stations. These stations are commonly those that are in Arbitron Metros, though data are missing for some stations within Metros. We restrict our analysis of the revenue metric to stations that are inside Arbitron Metros. We should make clear that the revenue figures are third party estimates and as such may be subject to a significant margin of error. However, we note that BIA/Kelsey is a well-respected firm that has been providing business intelligence on the radio industry for many years. Unlike the ratings data, we possess revenue data for all three years of our analysis.

C. Information on Radio Markets

14. The final component of the dataset is the characteristics of the Arbitron Metros. These data are also a by-product of the Commission's 2010 Quadrennial Review of Media Ownership Rules. For each Arbitron Metro as of 12/31/2005, 12/31/2007, and 12/31/2009 an assortment of demographic and market structure variables are available. Among the broad range of demographic information is information on incomes, racial and ethnic composition, and consumer expenditures. Media market structure variables are also available in these data. This information includes things such as the number of media outlets in a market and the number of media owners in the market.

II. Analytical Framework

15. Our analysis proceeds in two steps. In the first step we produce relatively simple estimates that compare the average values of the performance metrics of full-service commercial FM stations that have a presence of LPFM stations, as measured by the contour, market, and contour/market methods, to full-service commercial FM stations that do not have any LPFM stations present. We perform hypothesis tests on the differences in the averages of the performance measures for the various groups. We also break these comparisons down in terms of the size of the radio market and in terms of the broadcast format of the full-service commercial FM stations.

16. Interpretation of the tabular results should proceed with caution. Though the tables provide a nice, easy to understand analytical framework, the limited dimensions by which full-service commercial FM stations can be distinguished can, under certain circumstances, lead to what can be loosely referred to as spurious correlation. This situation can occur when important characteristics which influence the performance measure are not included in the analysis. If those omitted characteristics are correlated with the included characteristics, such as the presence of an LPFM station, then the true correlation between the included characteristic and the performance measure can be masked. Many terms such as omitted variable bias and endogeneity are used to describe this effect and much of the practice of econometrics revolves around reducing these effects to the largest extent practicable. When we proceed to the second stage of our numerical analysis we will employ several techniques to address this issue.

17. The problem of spurious correlation is most pronounced when the characteristic of interest is not randomly distributed within the population of interest. This is likely to be the case with regard to the presence of LPFM stations. The presence of an LPFM station occurs when two conditions are satisfied: (1) a community organization wishes to establish a station and (2) FCC licensing policies

allow the LPFM station to operate in the region. Neither of these occurrences is likely to be independent of market conditions. As such, the situation is ripe for the presence of spurious correlation and can lead the analyst to infer a causal relationship between variables when none exists. We therefore urge cautious interpretation of the tabular results.

18. A second issue to be aware of is the interpretation of a multitude of statistical tests. Each of the tables presents a series of statistical tests to evaluate the differences in the means of the performance metrics of various groups of commercial FM stations. We generally employ the standard measure of significance: a 5 percent probability that we will reject the hypothesis that the two performance measures are equal based on the data we observed, when in fact the true values of the means are equal. This is referred to as a Type I error. This measure generates the standard 95 percent level of confidence we use in our hypothesis testing. However, in cases when we are conducting many different hypothesis tests, such as here, caution must be exercised in placing too much interpretation on the result of a single hypothesis test. When multiple related hypothesis tests are performed, the probability of committing a Type I error may rise well above the 5 percent level. This implies that the probability of falsely concluding that LPFM stations adversely impact full-service commercial FM stations may be greater than 5 percent. Numerous methods exist to adjust hypothesis tests for this feature; however we do not employ them for this study.⁴

19. Our concern over spurious correlation leads us to the second method of analysis we employ. We use regression methods that will allow us to control for a number of sources of spurious correlation. Spurious correlation can be generated when the unobserved characteristics of commercial FM stations that influence economic performance are correlated with the presence of LPFM stations. We refer to these as station specific effects because while they have a constant effect over time on the station, their effect is different for different stations that have different levels of the unobserved characteristics. We also are able to control for unobserved characteristics that affect all stations at a point in time in a similar manner such as the business cycle. When this temporal effect is correlated with LPFM entry, we may end up with spurious correlation. We can use two equivalent methods to remove the spurious correlation caused by these two types of unobserved characteristics.⁵ Fixed effects estimation estimates the magnitude of each of the station specific effects as well as the effect of the time period. The first difference method estimates the effect of changes in the degree of LPFM presence with changes in the performance metric of a station. It is this latter method, though equivalent to fixed effects estimation, which provides the most intuitive explanation of the identification strategy. The first differences estimation strategy explains the changes in a station's performance metric as a function of changes to the presence of LPFM stations and other characteristics such as market demographics that change over time. We are able to identify the effect of LPFM stations on the performance metric by comparing the changes in the performance metric of stations that experienced a change in LPFM presence to the changes in the performance metric of stations that did not experience a change in LPFM presence. By comparing the changes rather than the absolute levels of the performance metric we are able to remove the influence of unobserved characteristics that, while constant within a station at all points in time, are correlated with the presence of LPFM stations as well. It is these estimates which we argue provide superior estimates of the true effect of LPFM stations on commercial FM stations.

⁴ See, e.g., J.P. Shaffer, *Multiple Hypothesis Testing*, 46 ANN. REV. OF PSYCHOLOGY 561-84, (1995); N.E. Savin, *Multiple Hypothesis Testing*, in HANDBOOK OF ECONOMETRICS 827-79 (Z. Griliches and M.D. Intriligator ed., 1984).

⁵ See J.M. WOOLDRIDGE, *ECONOMETRIC ANALYSIS OF CROSS SECTION AND PANEL DATA* 284-85 (2002) (comparing these two methods).

III. Tabular Analysis

20. Our tabular analysis begins with a simple examination of the distribution of LPFM stations in the U.S. and the extent of their presence with full-service commercial FM stations. This subsection is intended to provide a base level of information regarding how common it is that LPFM stations interact with full-service commercial FM stations. We also examine the geographic areas and types of stations most typically involved in these interactions.

21. In the second analytical subsection we examine the influence of LPFM stations on the ratings of full-service commercial FM stations. Ratings are a key driver to the economic health of commercial FM stations. The final subsection of our tabular analysis examines the relationship between full-service commercial FM stations' revenue and the presence of LPFM stations. While revenue strikes at the heart of the economic health of a commercial radio station, we do suggest cautious interpretation because the revenue information represents third-party assessments of the economic health of full-service commercial FM stations.

A. Analysis of the Distribution of LPFM Stations

22. Our analysis begins by documenting the existence and changes over time in the number of LPFM stations that were on the air. Table 1 presents the number of LPFM stations operating as of December 31 of 2005, 2007, and 2009. These values are broken down by the size of the radio market where the LPFM station is physically located. We rank the markets based on estimates of the persons at least 18 years old that reside in the market. Almost half of all LPFM stations are located outside of Arbitron Metros. Of the LPFM stations assigned to an Arbitron Metro, it appears that larger markets generally have more LPFM stations than the smaller markets, though the effect is not universal. What is much more universal is the steady increase in the numbers of LPFM stations that are in Arbitron Metros as well of those that are not in a Metro during this period.⁶ The growth rate of LPFM stations, at least in these years, has been higher in Arbitron Metros. Finally we note that some of the year-to-year variation within particular market size categories is due to changes in the rankings of markets over time. As such, it may be more appropriate to compare the broader categories such as markets ranked 1-100, rather than the narrower categories such as markets ranked 1-10.

⁶ We note, however, that by 2011, slightly more than half of LPFM stations are located outside of Arbitron Metros and the total number of LPFM stations on the air declined from 861 to 835. See Appendix A.1.

Table 1
Total Number of LPFM Stations by Arbitron Metro Size

Markets Ranked by Size	2005	2007	2009
1 - 10	17	24	26
11 - 20	16	14	17
21 - 30	11	20	21
31 - 40	12	14	15
41 - 50	12	18	18
51 - 60	14	20	24
61 - 70	14	15	14
71 - 80	5	8	21
81 - 90	17	27	19
91 - 100	8	11	14
1 - 100	126	171	189
101 - 110	16	21	22
111 - 120	14	15	15
121 - 130	7	9	8
131 - 140	12	18	21
141 - 150	10	10	10
151 - 160	14	15	17
161 - 170	11	15	13
171 - 180	8	11	9
181 - 190	7	9	15
191 - 200	9	8	9
101 - 200	108	131	139
201 - 210	11	11	12
211 - 220	5	11	8
221 - 230	10	9	11
231 - 240	9	10	18
241 - 250	14	14	10
251 - 260	9	17	14
261 - 270	7	21	23
271 - 280	4	5	3
281 - 290	10	12	14
> 290	3	13	6
> 200	82	123	119
Non-Arbitron Market Areas	392	414	424
Total	698	829	861

Total does not add up to the sum of stations in each market group because radio stations can be in multiple markets.

23. Table 2 restates table 1 as the average number of LPFM stations in a market for different sizes of markets. The general pattern that larger markets tend to have more LPFM stations is reinforced.

What is striking about this table is that it is uncommon for these market groups to average more than two LPFM stations. However, this aggregation does hide a few markets with very significant LPFM presence. While in 2005, the market with the most LPFM stations only had 6, by 2009, this same market, Gainesville, had 11 LPFM stations.

Table 2
Average Number of LPFM Stations in a Market by Size of the Arbitron Metro

Markets Ranked by Size	2005	2007	2009
1 - 10	1.70	2.40	2.60
11 - 20	1.60	1.40	1.70
21 - 30	1.10	2.00	2.10
31 - 40	1.20	1.40	1.50
41 - 50	1.20	1.80	1.80
51 - 60	1.40	2.00	2.40
61 - 70	1.40	1.50	1.40
71 - 80	0.50	0.80	2.10
81 - 90	1.70	2.70	1.90
91 - 100	0.80	1.10	1.40
1 - 100	1.26	1.71	1.89
101 - 110	1.60	2.10	2.20
111 - 120	1.40	1.50	1.50
121 - 130	0.70	0.90	0.80
131 - 140	1.20	1.80	2.10
141 - 150	1.00	1.00	1.00
151 - 160	1.40	1.50	1.70
161 - 170	1.10	1.50	1.30
171 - 180	0.80	1.10	0.90
181 - 190	0.70	0.90	1.50
191 - 200	0.90	0.80	0.90
101 - 200	1.08	1.31	1.39
201 - 210	1.10	1.10	1.20
211 - 220	0.50	1.10	0.80
221 - 230	1.00	0.90	1.10
231 - 240	0.90	1.00	1.80
241 - 250	1.40	1.40	1.00
251 - 260	0.90	1.70	1.40
261 - 270	0.70	2.10	2.30
271 - 280	0.40	0.50	0.30
281 - 290	1.00	1.20	1.40
> 290	0.50	1.18	0.67
> 200	0.85	1.22	1.20

24. Table 3 presents additional information on the distribution of LPFM stations within markets. As demonstrated, about one-third of markets do not have any LPFM stations. In 2005, over 88 percent of the Arbitron Metros had less than 3 LPFM stations physically located in the market. In 2007 and 2009, it was still the case that more than 80 percent of markets had less than 3 LPFM stations.

Table 3
Distribution of Arbitron Metros by the Number of LPFM Stations

Number of LPFM Stations	2005	2007	2009
0	127	102	93
1	81	81	87
2	53	64	60
3	21	28	29
4	7	11	14
> 4	7	15	16

25. Table 4 examines the presence of LPFM stations in the contour of full-service commercial FM stations broken down by the programming format broadcast by the full-service commercial FM station. By using the contour measure rather than the market measure of LPFM interaction we are able to examine this distribution for full-service commercial FM stations in Arbitron Metros as well as those outside the Metros. As the table demonstrates, the majority of full-service commercial FM stations broadcast music. While it appears to be slightly more common for music stations to have an LPFM station in their contour, caution should be exercised in this interpretation. As we have seen in the tables above, the distribution of LPFM stations is not random. LPFM stations assigned to Arbitron Metros are more commonly found in more populous markets. The correlation observed in this table may exist because there are more music formatted stations in populous markets.

Table 4
Distribution of Full-Service Commercial FM Stations by Format and Presence of LPFM Station in the Contour

Format	2005		2007		2009	
	LPFM Present	Total	LPFM Present	Total	LPFM Present	Total
Music	2,636	5,350	2,875	5,269	2,864	5,182
Foreign Language	131	330	174	355	192	372
Religion	128	319	138	308	139	319
News/Talk/Sports	69	148	101	194	147	261
Miscellaneous	18	46	78	138	158	252

26. In summary, table 3 provides encouraging evidence for our ability to estimate the effect of LPFM stations on full-service commercial FM stations. We have a significant number of locations that do not have any LPFM stations. Comparing those locations to markets where LPFM stations are present will help identify any impact that exists. Table 4 is less encouraging on our likely success in identifying an effect based on the format broadcast by the full-service commercial FM station. While we observe large numbers of music stations, the numbers of stations broadcasting in the other categories is quite limited. We can expect significantly less precision in our estimates of the effect of LPFM stations on full-service commercial FM stations broadcasting these formats.

B. Analysis of Ratings

27. In this subsection we present our first rough estimates of the effect of LPFM stations on the economic performance of full-service commercial FM stations. The performance metric we use is the average quarter hour rating for persons aged 12+ for a full-service commercial FM station located in an Arbitron Metro. We confine our analysis to full-service commercial FM stations that are in Metros. While stations not located in Metros do receive ratings in Metros, the majority of their listeners do not reside in Metros. Accordingly, the majority of their listening is not rated and we restrict our analysis to the most significant sources of listeners to a station by only examining ratings in Metros in which a station is located.

28. In table 5, we calculate the average ratings for full-service commercial FM stations in each of three market size groups. These averages are broken into stations based on the number of LPFM stations present. There are three levels of LPFM presence: No LPFM stations, one LPFM station, and more than one LPFM station. We calculate the LPFM presence using our three different measures of presence: the market measure, the contour measure and the contour/market measure. The average ratings for the one LPFM and more than one LPFM categories are then compared to the average rating for stations with no LPFM presence using a standard two-sided unpaired t-test comparing the differences in the means of the separate groups. The results follow a fairly robust pattern, regardless of the market size band. Full-service commercial FM stations that have LPFM stations present using the market measure tend to have lower ratings than stations in markets without any LPFM stations. However, when we measure LPFM presence based on the contour or contour/market methods we find the opposite results. Full-service commercial FM stations with one or more LPFM stations inside their contour (as well as inside the contour and in the same market) have significantly higher ratings than full-service commercial FM stations that do not have LPFM stations inside their contour. At first glance this seems a curious result. However, as discussed previously, we urge caution with regard to spurious correlation. It may well be the case that LPFM stations tend to be present in areas where full-service commercial FM stations tend to have higher or lower ratings for reasons unrelated to the presence of the LPFM stations.

Table 5
Average Rating of Full-Service Commercial FM Stations by Size of Arbitron Metro and Presence of LPFM Stations

	Year	No LPFM	One LPFM	Two or More LPFM
Market Rank 1 - 100				
Market Measure	2005	0.341 (714)	0.342 (395)	0.271 * (706)
	2007	0.331 (454)	0.314 (402)	0.280 * (861)
Contour Measure	2005	0.273 (843)	0.335 * (444)	0.362 * (528)
	2007	0.258 (629)	0.312 * (417)	0.337 * (671)
Contour/Market Measure	2005	0.288 (1081)	0.349 * (453)	0.359 * (281)
	2007	0.263 (824)	0.329 * (438)	0.345 * (455)
Market Rank 101 - 200				
Market Measure	2005	0.463 (410)	0.396 * (313)	0.379 * (444)
	2007	0.398 (353)	0.426 (277)	0.348 * (553)
Contour Measure	2005	0.317 (409)	0.405 * (340)	0.514 * (418)
	2007	0.290 (374)	0.361 * (317)	0.463 * (492)
Contour/Market Measure	2005	0.374 (601)	0.423 * (324)	0.496 * (242)
	2007	0.328 (535)	0.402 * (331)	0.450 * (317)
Market Rank > 200				
Market Measure	2005	0.509 (415)	0.515 (279)	0.484 (231)
	2007	0.508 (314)	0.475 (325)	0.470 (311)
Contour Measure	2005	0.438 (425)	0.497 * (255)	0.629 * (245)
	2007	0.405 (350)	0.491 * (279)	0.565 * (321)
Contour/Market Measure	2005	0.460 (534)	0.544 * (255)	0.607 * (136)
	2007	0.435 (437)	0.509 * (306)	0.553 * (207)

Table 5 (continued)
Average Rating of Full-Service Commercial FM Stations by Size of Arbitron Metro and Presence of LPFM Stations

	Year	No LPFM	One LPFM	Two or More LPFM
All Markets				
Market Measure	2005	0.419 (1539)	0.408 (987)	0.341 * (1381)
	2007	0.402 (1121)	0.397 (1004)	0.336 * (1725)
Contour Measure	2005	0.325 (1677)	0.398 * (1039)	0.470 * (1191)
	2007	0.305 (1353)	0.376 * (1013)	0.428 * (1484)
Contour/Market Measure	2005	0.353 (2216)	0.420 * (1032)	0.461 * (659)
	2007	0.324 (1796)	0.403 * (1075)	0.423 * (979)

* - difference between the category mean and the mean of the No LPFM category is statistically different from zero using a two-sided unpaired t-test at the 95 percent level of confidence.

Numbers in parentheses are the number of observations in the category

Ratings analyzed are the average quarter hour rating for persons aged 12+ in the Monday - Sunday 6am - 12m daypart in the Fall ratings period.

Observations are for ratings of stations in the Arbitron Metros the stations are home to as well as Metros where the stations are physically located.

29. Our concern with regard to the influence of unobservable market or station characteristics yielding spurious correlation can be reduced by examining the effect of changes in the number of LPFM stations in our measure between 2005 and 2007 with changes in the ratings of full-service commercial FM stations during the same period. The first differencing will remove a significant amount of the spurious correlation that is generated by the non-random distribution of LPFM stations in the markets. The comparisons are contained in table 6.

Table 6
Change in Average Rating of Full-Service Commercial FM Stations by Size of Arbitron Metro and
Change in Number of LPFM Stations

	No Change in LPFM	Increase in LPFM
Market Rank 1 – 100		
Market Measure	-0.021 (1047)	-0.024 (597)
Contour Measure	-0.019 (1164)	-0.029 (480)
Contour/Market Measure	-0.020 (1243)	-0.029 (401)
Market Rank 101 - 200		
Market Measure	-0.033 (880)	-0.028 (198)
Contour Measure	-0.031 (872)	-0.039 (200)
Contour/Market Measure	-0.031 (922)	-0.040 (153)
Market Rank > 200		
Market Measure	-0.034 (667)	-0.037 (155)
Contour Measure	-0.034 (675)	-0.037 (153)
Contour/Market Measure	-0.034 (691)	-0.038 (136)
All Markets		
Market Measure	-0.029 (2594)	-0.027 (950)
Contour Measure	-0.027 (2711)	-0.033 (833)
Contour/Market Measure	-0.027 (2856)	-0.033 (690)

* - difference between the Increase in LPFM category mean and the mean of the No Change in LPFM category is statistically different from zero using a two-sided unpaired t-test at the 95 percent level of confidence.

Numbers in parentheses are the number of observations in the category

Ratings analyzed are the difference between average quarter hour rating for persons aged 12+ in the Monday - Sunday 6am - 12m daypart in the Fall 2005 and Fall 2007 ratings periods.

Observations are for ratings of stations in the Arbitron Metros the stations are home to as well as Metros where the stations are physically located.

30. Table 6 illustrates that the change in the ratings of the average full-service commercial FM station is not significantly related to the entry of an LPFM station into the contour or market of the full-service commercial FM station. While the point estimates do indicate a slightly larger decrease in ratings among stations that saw the entry of an LPFM station, that difference is so small that it cannot be distinguished from zero. In fact, the values tend to be so small on average (0.03 in the case of the contour

measure for all markets) that they would be subsumed within the rounding that Arbitron uses when reporting ratings.

31. Our next avenue of investigation is to examine whether there is an effect of LPFM stations on full-service commercial FM stations that broadcast particular program formats. Table 7 analyzes the effect of the presence of LPFM stations on the ratings of a full-service commercial FM station of a particular format. As mentioned previously, the number of full-service commercial FM stations broadcasting certain formats is quite small and makes statistical precision difficult to achieve. In the current case, these numbers are further reduced by limiting the analysis to stations that are located in Arbitron Metros. While little can be said statistically about the results beyond the music format stations, we do notice a similar pattern to that found when analyzing the effects based on the size of the market. When the presence of LPFM stations is based on the market measure, the point estimates tend to indicate that LPFM stations lower the ratings of full-service commercial FM stations, though the effect is so small that it cannot be distinguished from zero. When we measure LPFM presence using the contour and contour/market measures, the point estimates indicate that full-service commercial FM stations that have an LPFM station present have higher ratings than those that do not. As with the market measure, these differences cannot generally be distinguished from zero for any stations other than music format stations.

Table 7
Average Rating of Full-Service Commercial FM Stations by Format and Presence of LPFM Stations

	Year	No LPFM	One LPFM	Two or More LPFM
Music Format				
Market Measure	2005	0.442 (1317)	0.433 (860)	0.363 * (1175)
	2007	0.422 (934)	0.420 (840)	0.357 * (1427)
Contour Measure	2005	0.343 (1400)	0.423 * (880)	0.493 * (1072)
	2007	0.318 (1093)	0.401 * (821)	0.450 * (1287)
Contour/Market Measure	2005	0.374 (1866)	0.446 * (893)	0.479 * (593)
	2007	0.342 (1463)	0.425 * (885)	0.444 * (853)
Foreign Language Format				
Market Measure	2005	0.371 (100)	0.302 (55)	0.255 * (86)
	2007	0.360 (77)	0.298 (65)	0.249 * (112)
Contour Measure	2005	0.305 (121)	0.335 (69)	0.306 (51)
	2007	0.295 (110)	0.312 (77)	0.278 (67)
Contour/Market Measure	2005	0.305 (155)	0.327 (63)	0.339 (23)
	2007	0.283 (139)	0.322 (76)	0.285 (39)
Religion Format				
Market Measure	2005	0.239 (72)	0.189 (46)	0.240 (62)
	2007	0.193 (45)	0.185 (39)	0.238 (68)
Contour Measure	2005	0.221 (95)	0.204 (49)	0.272 (36)
	2007	0.192 (65)	0.189 (45)	0.264 (42)
Contour/Market Measure	2005	0.217 (116)	0.198 (41)	0.326 (23)
	2007	0.192 (83)	0.195 (39)	0.287 (30)

Table 7 (continued)
Average Rating of Full-Service Commercial FM Stations by Format and Presence of LPFM Stations

	Year	No LPFM	One LPFM	Two or More LPFM
News/Talk/Sports Format				
Market Measure	2005	0.166 (41)	0.175 (20)	0.120 (50)
	2007	0.196 (27)	0.168 (31)	0.138 (71)
Contour Measure	2005	0.130 (50)	0.151 (35)	0.173 (26)
	2007	0.157 (47)	0.159 (39)	0.156 (43)
Contour/Market Measure	2005	0.136 (66)	0.148 (29)	0.188 (16)
	2007	0.154 (59)	0.166 (41)	0.152 (29)
Miscellaneous Format				
Market Measure	2005	0.167 (9)	0.267 (6)	0.300 (8)
	2007	0.389 (38)	0.500 (29)	0.349 (47)
Contour Measure	2005	0.082 (11)	0.467 * (6)	0.300 * (6)
	2007	0.318 (38)	0.423 (31)	0.456 * (45)
Contour/Market Measure	2005	0.123 (13)	0.450 (6)	0.300 (4)
	2007	0.323 (52)	0.529 * (34)	0.389 (28)

* - difference between the category mean and the mean of the No LPFM category is statistically different from zero using a two-sided unpaired t-test at the 95 percent level of confidence.

Numbers in parentheses are the number of observations in the category

Ratings analyzed are the average quarter hour rating for persons aged 12+ in the Monday - Sunday 6am - 12m daypart in the Fall ratings period.

Observations are for ratings of stations in the Arbitron Metros the stations are home to as well as Metros where the stations are physically located.

32. We continue our analysis of the effect of the presence of LPFM stations on full-service commercial FM stations by station format with an examination of the differences in ratings. We compare the change in ratings of stations of a particular format that had an increase in the presence of LPFM stations to similarly formatted full-service commercial FM stations that did not have a change in the presence of LPFM stations. Because stations may change formats during the period in question, we also limit our analysis to stations that maintained the same program format in 2005 and 2007. Table 8 presents these comparisons. The table presents no significant statistical evidence that the ratings of full-service commercial FM stations are influenced by the presence of LPFM stations. We do note that the number of observations available to test hypotheses in this instance is generally quite low. This limits our ability to make statistical inferences at any reasonable level of confidence.

Table 8
Change in Average Rating of Full-Service Commercial FM Stations by Format and Change in
Number of LPFM Stations

	No Change in LPFM	Increase in LPFM
Music Format		
Market Measure	-0.032 (2138)	-0.028 (779)
Contour Measure	-0.029 (2217)	-0.036 (700)
Contour/Market Measure	-0.030 (2336)	-0.034 (582)
Foreign Language Format		
Market Measure	-0.035 (137)	-0.019 (57)
Contour Measure	-0.034 (152)	-0.019 (42)
Contour/Market Measure	-0.033 (163)	-0.019 (31)
Religion Format		
Market Measure	-0.028 (101)	-0.012 (34)
Contour Measure	-0.030 (110)	0.004 (26)
Contour/Market Measure	-0.029 (114)	0.005 (22)
News/Talk/Sports Format		
Market Measure	0.012 (57)	-0.008 (24)
Contour Measure	0.013 (63)	-0.013 (16)
Contour/Market Measure	0.011 (65)	-0.020 (15)

Table 8 (continued)
Change in Average Rating of Full-Service Commercial FM Stations by Format and Change in Number of LPFM Stations

	No Change in LPFM	Increase in LPFM
Miscellaneous Format		
Market Measure	-0.050 (10)	0.000 (2)
Contour Measure	-0.050 (10)	0.000 (2)
Contour/Market Measure	-0.050 (10)	0.000 (2)

* - difference between the Increase in LPFM category mean and the mean of the No Change in LPFM category is statistically different from zero using a two-sided unpaired t-test at the 95 percent level of confidence.

Numbers in parentheses are the number of observations in the category

Ratings analyzed are the difference between average quarter hour rating for persons aged 12+ in the Monday - Sunday 6am - 12m daypart in the Fall 2005 and Fall 2007 ratings periods.

Observations are for ratings of stations in the Arbitron Metros the stations are home to as well as Metros where the stations are physically located. Stations that changed formats between 2005 and 2007 are excluded from analysis.

C. Analysis of Revenue

33. We follow our simple tabular analysis of the ratings of full-service commercial FM stations with a similar analysis of estimates of the annual revenue earned by full-service commercial FM stations. When analyzing the revenue of stations we divide a station's revenue by the number of persons aged 18+ in the radio market. We do this in order to reduce the influence of market characteristics on our results. Because stations generate revenue based on the number of listeners they can deliver, controlling for the potential listeners should equalize markets of disparate sizes. As with the previous analyses we limit our sample to full-service commercial stations that are present in an Arbitron Metro. When analyzing revenue we have chosen not to use the contour/market measure for determining the presence of LPFM stations. We do this because we view it as too limiting of a definition when analyzing revenue. Our revenue estimates are for revenue earned from all markets. While that revenue is mainly earned in the station's largest market, it also may come from areas outside that market but that are within the station's service contour. Therefore both the contour and market measures provide some indication of the presence of an LPFM station in the area generating the revenue. But requiring the presence of the LPFM to be in the market and within the contour would be restricting the effect to too small of a region.

34. Table 9 presents a comparison between average annual revenue per adult earned by full-service commercial FM stations and the number of LPFM stations present. The results are further broken down by market size. The results are strikingly similar to those found when analyzing station ratings. In addition, the data from 2009 tends to follow a pattern similar to that found in 2005 and 2007. When the presence of LPFM stations is measured using the market measure, it appears that the presence of two or more LPFM stations may reduce the revenues of a full-service commercial FM station by about 20 percent. If the contour method is used, the results suggest that the full-service commercial FM station's revenues increase over 60 percent when there are at least two LPFM stations present. As with the ratings analysis, we view this as strong evidence that unobserved market characteristics are having an undue influence on the analysis. Accordingly we will turn to an analysis of the changes in revenues resulting from changes in the presence of LPFM stations.

Table 9
Average Full-Service Commercial FM Stations' Revenue per Adult by Market

	Year	No LPFM	One LPFM	Two or More LPFM
Market Rank 1 - 100				
Market Measure	2005	3.47 (663)	3.66 (378)	3.03 * (580)
	2007	3.45 (447)	3.27 (381)	3.17 (783)
	2009	2.50 (473)	2.42 (344)	2.22 * (825)
Contour Measure	2005	2.69 (737)	3.38 * (407)	4.38 * (477)
	2007	2.45 (595)	3.22 * (396)	4.10 * (620)
	2009	1.81 (605)	2.23 * (349)	2.87 * (688)
Market Rank 101 - 200				
Market Measure	2005	5.73 (371)	4.18 * (308)	3.78 * (406)
	2007	5.57 (324)	4.67 * (257)	3.61 * (533)
	2009	4.48 (264)	3.36 * (302)	2.81 * (540)
Contour Measure	2005	3.39 (373)	4.10 * (323)	6.06 * (389)
	2007	3.15 (341)	3.72 * (305)	5.81 * (468)
	2009	2.21 (301)	2.87 * (323)	4.40 * (482)
Market Rank > 200				
Market Measure	2005	5.97 (382)	6.18 (249)	5.29 (210)
	2007	5.79 (293)	5.91 (297)	5.51 (295)
	2009	4.54 (267)	4.48 (344)	4.09 (265)
Contour Measure	2005	4.75 (374)	6.24 * (239)	7.28 * (228)
	2007	4.48 (312)	5.89 * (270)	6.89 * (303)
	2009	3.46 (278)	4.21 * (290)	5.37 * (308)

Table 9 (continued)
Average Full-Service Commercial FM Stations' Revenue per Adult by Market

	Year	No LPFM	One LPFM	Two or More LPFM
All Markets				
Market Measure	2005	4.74 (1416)	4.50 (935)	3.68 * (1196)
	2007	4.74 (1064)	4.49 (935)	3.75 * (1611)
	2009	3.56 (1004)	3.42 (990)	2.72 * (1630)
Contour Measure	2005	3.38 (1484)	4.33 * (969)	5.58 * (1094)
	2007	3.15 (1248)	4.12 * (971)	5.28 * (1391)
	2009	2.30 (1184)	3.04 * (962)	3.89 * (1478)

* - difference between the category mean and the mean of the No LPFM category is statistically different from zero using a two-sided unpaired t-test at the 95 percent level of confidence.

Numbers in parentheses are the number of observations in the category

Revenue per adult is calculated as the station revenue divided by the population 18+ in the station's home market.

Observations are for stations that are home to an Arbitron Metro. Stations are assigned to the single market that BIA/Kelsey considers as the station's home market.

35. Our analysis of the changes in annual revenue is intended to remove a substantial portion of the spurious correlation that exists due to unobserved market characteristics. The results in table 10 are more robust than their counterparts of table 6 which analyzed changes in ratings. About a third of the estimated changes are found to be statistically significant. In many markets we find that measuring the presence of LPFM with the market measure indicates that an increase in the number of LPFM stations will actually increase a full-service commercial station's revenues. The statistically significant contour measures in table 10 consistently paint a picture of reduced revenues accompanying the entry of LPFM stations.

Table 10
Change in Average Full-Service Commercial FM Stations' Revenue per Adult by Market

	Year	No Change in LPFM	Increase in LPFM
Market Rank 1 - 100			
Market Measure	2005-2007	-0.132 (997)	-0.106 (566)
	2007-2009	-0.911 (1210)	-0.881 (289)
Contour Measure	2005-2007	-0.134 (1110)	-0.095 (453)
	2007-2009	-0.861 (1286)	-1.110 * (247)
Market Rank 101 - 200			
Market Measure	2005-2007	-0.066 (846)	-0.066 (192)
	2007-2009	-1.108 (932)	-0.689 * (109)
Contour Measure	2005-2007	-0.048 (845)	-0.162 (189)
	2007-2009	-1.072 (956)	-0.843 (95)
Market Rank > 200			
Market Measure	2005-2007	-0.021 (601)	-0.395 * (154)
	2007-2009	-1.345 (752)	-1.241 (60)
Contour Measure	2005-2007	-0.034 (616)	-0.407 * (145)
	2007-2009	-1.330 (734)	-1.388 (73)
All Markets			
Market Measure	2005-2007	-0.082 (2444)	-0.146 (912)
	2007-2009	-1.087 (2894)	-0.883 * (458)
Contour Measure	2005-2007	-0.082 (2571)	-0.168 * (787)
	2007-2009	-1.045 (2976)	-1.098 (415)

* - difference between the Increase in LPFM category mean and the mean of the No Change in LPFM category is statistically different from zero using a two-sided unpaired t-test at the 95% level of confidence.

Numbers in parentheses are the number of observations in the category.

Revenue per adult is calculated as the station revenue divided by the population 18+ in the station's home market.

Observations are for stations that are home to an Arbitron Metro. Stations are assigned to the single market that BIA/Kelsey considers as the station's home market.

36. We now turn to analyzing the effect of the presence of LPFM stations on the annual revenues of full-service commercial FM stations with particular formats. Table 11 breaks down these stations' average annual revenue per adult based on the presence of LPFM stations and the program format of the full-service commercial FM station. These results are similar to those observed with our analysis of ratings. When we measure the presence of LPFM using the market measure we find that the presence of LPFM stations tends to lower revenue for music formatted stations. However, when we use the contour measure, the results indicate that the presence of LPFM stations tends to increase the revenue of full-service commercial FM stations with music and foreign language formats. In addition we note that this effect of increasing revenue when an LPFM station is in the contour carries over to the other formats examined. This situation spurs us to consider how changes in the presence of LPFM stations influences changes in the annual revenue per adult of full-service commercial FM stations.

Table 11
Average Full-Service Commercial FM Stations' Revenue per Adult by Format

	Year	No LPFM	One LPFM	Two or More LPFM
Music Format				
Market Measure	2005	5.08 (1229)	4.86 (819)	4.00 * (1019)
	2007	5.08 (896)	4.77 (788)	4.05 * (1333)
	2009	3.84 (805)	3.67 (810)	2.93 * (1295)
Contour Measure	2005	3.65 (1250)	4.71 * (827)	5.91 * (990)
	2007	3.37 (1018)	4.42 * (793)	5.62 * (1206)
	2009	2.48 (925)	3.29 * (766)	4.14 * (1219)
Foreign Language Format				
Market Measure	2005	2.45 (89)	2.07 (50)	1.85 * (75)
	2007	2.87 (69)	2.28 (57)	2.17 * (104)
	2009	2.23 (76)	1.49 * (54)	1.53 * (116)
Contour Measure	2005	2.04 (108)	2.17 (64)	2.40 (42)
	2007	2.31 (98)	2.46 (73)	2.51 (59)
	2009	1.70 (103)	1.76 (68)	1.77 (75)
Religion Format				
Market Measure	2005	2.14 (55)	1.65 (41)	1.30 * (52)
	2007	1.53 (39)	1.85 (32)	1.33 (62)
	2009	1.18 (34)	1.59 (36)	0.88 (57)
Contour Measure	2005	1.70 (73)	1.55 (42)	1.93 (33)
	2007	1.19 (53)	1.51 (40)	1.95 * (40)
	2009	0.88 (53)	1.22 (31)	1.46 * (43)

Table 11 (continued)
Average Full-Service Commercial FM Stations' Revenue per Adult by Format

	Year	No LPFM	One LPFM	Two or More LPFM
News/Talk/Sports Format				
Market Measure	2005	3.02 (35)	2.35 (20)	2.46 (44)
	2007	2.83 (25)	2.87 (33)	2.19 (71)
	2009	1.94 (38)	1.94 (46)	1.66 (83)
Contour Measure	2005	2.31 (45)	2.80 (30)	3.03 (24)
	2007	2.05 (45)	2.76 (38)	2.71 (46)
	2009	1.50 (56)	1.81 (48)	2.07 * (63)
Miscellaneous Format				
Market Measure	2005	3.03 (8)	2.51 (5)	1.34 (6)
	2007	4.54 (35)	6.17 (25)	4.32 (41)
	2009	3.94 (51)	4.27 (44)	3.43 (79)
Contour Measure	2005	1.52 (8)	1.77 (6)	4.43 (5)
	2007	3.46 (34)	5.44 * (27)	5.64 * (40)
	2009	2.68 (47)	3.33 (49)	4.75 * (78)

* - difference between the category mean and the mean of the No LPFM category is statistically different from zero using a two-sided unpaired t-test at the 95 percent level of confidence.

Numbers in parentheses are the number of observations in the category. Numbers in parentheses are the number of observations in the category.

Revenue per adult is calculated as the station revenue divided by the population 18+ in the station's home market.

Observations are for stations that are home to an Arbitron Metro. Stations are assigned to the single market that BIA/Kelsey considers as the station's home market.

37. In table 12 we examine how changes in the presence of LPFM stations are correlated with changes in the annual revenues of full-service commercial FM stations. In general there is not a significant statistical relationship between the two factors. However, for stations with a religious format in 2005 and 2007, an increase in the presence of LPFM stations does correlate with a decrease in revenues of full-service commercial FM stations in the 2005-2007 time frame regardless of the measure used to indicate the presence of LPFM stations. While we also find some evidence for an effect on music formatted stations, that evidence is mixed based upon the measure of LPFM presence.

Table 12
Change in Average Full-Service Commercial FM Stations' Revenue per Adult by Format

	Year	No Change in LPFM	Increase in LPFM
Music Format			
Market Measure	2005-2007	-0.108 (2026)	-0.177 (745)
	2007-2009	-1.191 (2193)	-1.019 * (320)
Contour Measure	2005-2007	-0.101 (2111)	-0.217 * (661)
	2007-2009	-1.153 (2224)	-1.226 (314)
Foreign Language Format			
Market Measure	2005-2007	0.200 (128)	0.395 (55)
	2007-2009	-0.729 (132)	-0.698 (32)
Contour Measure	2005-2007	0.208 (148)	0.470 (35)
	2007-2009	-0.710 (149)	-0.782 (20)
Religion Format			
Market Measure	2005-2007	0.040 (89)	-0.396 * (31)
	2007-2009	-0.440 (81)	-0.458 (18)
Contour Measure	2005-2007	-0.012 (97)	-0.329 * (24)
	2007-2009	-0.421 (88)	-0.559 (14)

Table 12 (continued)
Change in Average Full-Service Commercial FM Stations' Revenue per Adult by Format

	Year	No Change in LPFM	Increase in LPFM
News/Talk/Sports Format			
Market Measure	2005-2007	0.165 (55)	-0.221 (24)
	2007-2009	-0.737 (56)	-0.523 (9)
Contour Measure	2005-2007	0.094 (62)	-0.234 (16)
	2007-2009	-0.654 (58)	-0.928 (9)
Miscellaneous Format			
Market Measure	2005-2007	0.144 (9)	-0.385 (2)
	2007-2009	-0.792 (8)	-0.836 (2)
Contour Measure	2005-2007	0.144 (9)	-0.385 (2)
	2007-2009	-0.792 (8)	-0.836 (2)

* - difference between the Increase in LPFM category mean and the mean of the No Change in LPFM category is statistically different from zero using a two-sided unpaired t-test at the 95% level of confidence.

Numbers in parentheses are the number of observations in the category.

Revenue per adult is calculated as the station revenue divided by the population 18+ in the station's home market.

Observations are for stations that are home to an Arbitron Metro. Stations are assigned to the single market that BIA/Kelsey considers as the station's home market. Stations that changed formats between 2005 and 2009 are excluded from analysis.

D. Summary

38. Our tabular analysis has pointed to a number of curious results that serve as an indicator that significant unobserved market and station characteristics may be influencing the analysis. The direction of the effect of the presence of LPFM on a full-service commercial FM station varies significantly based on the measure used. In addition, many of the estimated impacts disappear when we correlate changes in the performance metric with changes in the presence of LPFM stations. Accordingly, we now proceed with regression analyses which will provide further controls for the unobserved characteristics that we believe are correlated with our performance measures and with LPFM entry.

IV. Regression Analysis

39. In this section we use regression methods to examine the relationship between the economic performance of full-service commercial FM stations and the presence of LPFM stations. Our regression methods are intended to further refine the investigation begun in the previous section. Our greatest concern with tabular analysis was the presence of spurious correlation due to the inability to

control for market characteristics that were changing over time and happened to be correlated with entry by LPFM stations. Regression methods will allow us to control for these changing elements of market structure that we can observe. In addition to controlling for changing demographics, we can include more robust controls for the competitive situation in the markets. It is this latter set of controls which we believe are most important. We use a wide variety of different controls for competition from other full-service radio stations in addition to our measure for the presence of LPFM stations. Full-service station competition is measured by the number of AM and FM stations inside the station's contour as well as the number of AM and FM stations inside the station's market. These measures roughly parallel our measures of the presence of LPFM stations. We expand our measure of full-service radio station competition further. The impact of the number of stations of the same format that are in the same market as the station being analyzed is examined. This measure hones in more finely on stations that are likely to be the closest substitutes to each other for a significant group of listeners.

40. As discussed previously, we use first differences for our regression analysis. This means that we explain changes in the performance metrics over time as a function of changes in the presence of LPFM stations, changes in competition, and changes in market demographics. This method allows for the removal of the effect of market characteristics which do not vary over time in the market. This serves to remove a significant source of spurious correlation that might be generated due to any potential correlation between the presence of LPFM stations and levels of the market characteristics.

A. Analysis of Ratings

41. We begin our regression analysis by examining the factors that influence ratings. In the tables that follow, we present estimates derived from a variety of regression formats. In addition to examining the three different measures of LPFM station presence, we use a variety of measures of competition by other full-service radio stations. Finally, we examine the effect of LPFM stations on full-service commercial FM stations broadcasting particular program formats which have been suggested as being most comparable to the program formats broadcast by LPFM stations.

42. Table 13 presents a set of three regressions that estimate the effect of LPFM entry on full-service commercial FM station ratings. Each regression examines the effect of a different measure of LPFM entry. The sample used in this estimation consists of the ratings for all full-service commercial FM stations that are in a market. However both ratings for markets that a station was not in, as well as ratings for the markets the station was in are used in the analysis. In a later analysis we restrict our examination to the ratings earned in markets in which the station is located. Using these data and regression form we find that LPFM entry does not have a statistically significant effect on the ratings of full-service commercial FM stations when measured as the number of LPFM stations in the contour or as the number of LPFM stations in the market. However, when we measure the presence of LPFM stations that are in both the contour and in the market we find a statistically significant, though small in magnitude, negative effect. This measured effect suggests that if an additional LPFM station entered into the market and the contour of the average full-service commercial FM station, there would be a ratings decline of 0.008 ratings points for the full week daypart among persons aged 12+. We view this as a nearly trivial amount. Arbitron ratings are reported in increments of 0.1. Our results indicate that 13 LPFM stations would need to enter into a full-service commercial station's market and contour before the effect would be discernible in the ratings issued by Arbitron. Furthermore, our results indicate that if the LPFM station entered only into the contour or the market, but not both, the effect would not likely be evident at all. This estimated effect of LPFM entry can also be compared to the effect of having a full-service FM or AM station enter into the market or contour. Our point estimates show that the effect of LPFM entry would be at least 4 times that which would occur if a single AM or FM station entered the market or contour. We find the proposition that an LPFM station has a larger impact on the ratings of a full-service commercial FM station than do other full-service radio stations to be highly unlikely. Our suspicion is that this single statistically significant coefficient may be evidence of our concern over multiple hypothesis tests that were previously discussed.

Table 13
Effect of LPFM Entry on the Ratings of Full-Service Commercial FM Stations in all Radio Markets

Independent Variable	Contour Measure	Market Measure	Contour/Market Measure
Number of LPFM stations	0.001 (0.53)	0.002 (1.07)	-0.008 (2.36)*
Number of AM stations in market	-0.002 (1.27)	-0.002 (1.25)	-0.002 (1.48)
Number of AM stations in contour	-0.002 (0.97)	-0.002 (0.89)	-0.002 (0.84)
Number of FM stations in market	0.000 (0.37)	0.000 (0.32)	0.000 (0.38)
Number of FM stations in contour	-0.002 (1.59)	-0.002 (1.56)	-0.002 (1.51)
Number of commercial TV stations	-0.001 (0.24)	-0.001 (0.34)	-0.000 (0.10)
Number of digital radio stations in market	0.000 (0.86)	0.000 (0.71)	0.000 (1.13)
Number of newspapers in market	0.003 (0.62)	0.003 (0.61)	0.003 (0.61)
Population 18+ in market	-0.000 (0.37)	-0.000 (0.39)	-0.000 (0.26)
Retail expenditures in market	-0.000 (0.40)	-0.000 (0.46)	-0.000 (0.20)
Per capita income in market	-0.000 (0.74)	-0.000 (0.64)	-0.000 (0.81)
Constant	-0.013 (5.81)**	-0.013 (5.92)**	-0.012 (5.57)**

* - estimated regression coefficient is different from zero at the 95 percent level of confidence.

** - estimated regression coefficient is different from zero at the 99 percent level of confidence.

t-statistics are in parentheses

Ratings analyzed are the average quarter hour rating for persons aged 12+ in the Monday - Sunday 6am – 12m daypart in the Fall ratings period.

Observations are for stations that are in an Arbitron Metro and did not change program formats between 2005 and 2007.

43. Table 14 reports additional functional forms that measure competition between full-service radio stations while examining the effect of our three measures of LPFM entry. These alternative specifications yield similar evidence of an effect of LPFM stations on full-service commercial FM stations. There is a very small, but statistically significant, negative effect on the ratings of full-service commercial FM stations when an LPFM station enters the same market and contour. We view this as a nearly trivial amount. Arbitron ratings are reported in increments of 0.1. Our results indicate that 14 LPFM stations would need to enter into a full-service commercial station's market and contour before the effect would be discernible in the ratings issued by Arbitron. Furthermore, our results indicate that if the LPFM station entered only into the contour or the market, but not both, the effect would not likely be evident at all. This estimated effect of LPFM entry can also be compared to the effect of having an FM or AM station enter into the market or contour. Our point estimates show that the effect of LPFM entry

would be at least 4 times that which would occur if a single AM or FM station entered the market or contour. The disparity is even larger when we consider the effect of adding an additional FM station of the same format to the market. We find the proposition that a LPFM station has a larger impact on the ratings of a full-service commercial FM station than do other full-service radio stations to be highly unlikely. It is most likely that this result derives from our inability to fully control for unobserved market characteristics that are varying over time and across markets. It is also possible that this statistically significant coefficient may be evidence of our concern over multiple hypothesis tests that were previously discussed.

Table 14
Effect of LPFM Entry on the Ratings of Full-Service Commercial FM Stations in all Radio Markets: Format Competition

Independent Variable	Contour Measure	Market Measure	Contour/ Market Measure
Number of LPFM stations	0.000 (0.31)	0.002 (1.22)	-0.007 (2.27)*
Number of similar format AM stations in market	0.001 (0.48)	0.001 (0.50)	0.001 (0.46)
Number of similar format FM stations in market	-0.001 (1.23)	-0.001 (1.32)	-0.001 (1.14)
Number of similar format non-commercial stations in market	-0.000 (0.02)	0.000 (0.09)	-0.000 (0.12)
Number of commercial TV stations in market	-0.001 (0.36)	-0.002 (0.48)	-0.001 (0.20)
Digital radio stations in market	0.000 (0.45)	0.000 (0.24)	0.000 (0.74)
Retail expenditures in market	-0.000 (0.72)	-0.000 (0.81)	-0.000 (0.53)
Population density of market	0.000 (0.16)	0.000 (0.17)	0.000 (0.26)
Constant	-0.014 (8.85)**	-0.015 (9.19)**	-0.014 (8.83)**

* - estimated regression coefficient is different from zero at the 95 percent level of confidence.

** - estimated regression coefficient is different from zero at the 99 percent level of confidence.

t-statistics are in parentheses

Ratings analyzed are the average quarter hour rating for persons aged 12+ in the Monday - Sunday 6am – 12m daypart in the Fall ratings period.

Observations are for stations that are in an Arbitron Metro and did not change program format categories between 2005 and 2007.

44. Tables 15 and 16 examine the same regression specifications as tables 13 and 14 with one exception. In these tables we restrict our analysis to the ratings that full-service stations receive in the markets in which they are located. This refinement, for example, removes the ratings of stations in the Baltimore Metro, when those stations are not located in Baltimore, but are considered to belong to nearby Metros such as Washington and Philadelphia. We view this refinement as bearing down more closely on the portion of a full-service commercial FM station's listener base that is most critical to its economic performance. The results for both tables 15 and 16 indicate that there is no statistically significant effect

of LPFM entry on the ratings of stations in their most significant markets. In addition, we note that the estimated effect of LPFM entry using the contour/market method in table 15 is positive, though it was negative (and statistically significant) in table 13. This would appear to indicate that much of the effect found in that particular regression specification in table 13 is being driven by listener behavior in markets that are outside of the full-service commercial FM stations home territory.

Table 15
Effect of LPFM Entry on the Ratings of Full-Service Commercial FM Stations in Home Radio Markets

Independent Variable	Contour Measure	Market Measure	Contour/Market Measure
Number of LPFM stations	0.000 (0.03)	0.007 (1.47)	0.004 (0.74)
Number of AM stations in market	-0.004 (0.97)	-0.003 (0.85)	-0.004 (0.90)
Number of AM stations in contour	-0.001 (0.12)	-0.001 (0.09)	-0.001 (0.13)
Number of FM stations in market	0.001 (0.35)	0.001 (0.30)	0.001 (0.39)
Number of FM stations in contour	-0.007 (1.63)	-0.007 (1.68)	-0.007 (1.69)
Number of commercial TV stations	-0.003 (0.29)	-0.005 (0.48)	-0.004 (0.38)
Number of digital radio stations in market	0.001 (0.96)	0.001 (0.70)	0.001 (0.84)
Number of newspapers in market	-0.000 (0.01)	-0.001 (0.04)	-0.000 (0.03)
Population 18+ in market	-0.000 (0.02)	-0.000 (0.11)	-0.000 (0.04)
Retail expenditures in market	-0.000 (0.20)	-0.000 (0.38)	-0.000 (0.28)
Per capita income in market	0.000 (0.14)	0.000 (0.22)	0.000 (0.19)
Constant	-0.032 (5.60)**	-0.034 (5.88)**	-0.033 (5.74)**

* - estimated regression coefficient is different from zero at the 95 percent level of confidence.

** - estimated regression coefficient is different from zero at the 99 percent level of confidence.

t-statistics are in parentheses

Ratings analyzed are the average quarter hour rating for persons aged 12+ in the Monday - Sunday 6am – 12m daypart in the Fall ratings period.

Observations are for ratings of stations in the Arbitron Metros the stations are home to as well as Metros where the stations are physically located. Only stations that did not change program format categories between 2005 and 2007 are analyzed.

Table 16
Effect of LPFM Entry on the Ratings of Full-Service Commercial FM Stations in Home Radio Markets: Format Competition

Independent Variable	Contour Measure	Market Measure	Contour/ Market Measure
Number of LPFM stations	-0.000 (0.08)	0.007 (1.49)	0.004 (0.67)
Number of similar format AM stations in market	0.001 (0.32)	0.001 (0.38)	0.001 (0.36)
Number of similar format FM stations in market	-0.001 (0.75)	-0.001 (0.89)	-0.001 (0.78)
Number of similar format non-commercial stations in market	-0.002 (0.40)	-0.001 (0.26)	-0.002 (0.36)
Number of commercial TV stations in market	-0.003 (0.27)	-0.005 (0.49)	-0.004 (0.37)
Digital radio stations in market	0.001 (0.91)	0.001 (0.59)	0.001 (0.78)
Retail expenditures in market	-0.000 (0.44)	-0.000 (0.62)	-0.000 (0.52)
Population density of market	0.000 (0.53)	0.000 (0.50)	0.000 (0.48)
Constant	-0.035 (7.99)**	-0.036 (8.32)**	-0.035 (8.17)**

* - estimated regression coefficient is different from zero at the 95 percent level of confidence.

** - estimated regression coefficient is different from zero at the 99 percent level of confidence.

t-statistics are in parentheses

Ratings analyzed are the average quarter hour rating for persons aged 12+ in the Monday - Sunday 6am – 12m daypart in the Fall ratings period.

Observations are for ratings of stations in the Arbitron Metros the stations are home to as well as Metros where the stations are physically located. Only stations that did not change program format categories between 2005 and 2007 are analyzed.

45. We now proceed to examine the effect of LPFM entry on those full-service commercial FM stations that have program formats most likely to be duplicated by LPFM stations. We chose these formats based on the analysis of LPFM station formats contained in Appendix A.1. We examine three categories and a fourth broader collection of program formats. We separately estimate the regression specifications contained in tables 13 and 15 on the full-service commercial FM stations of the particular program format. In the interest of preserving space, we only report the estimated coefficient on our measures of LPFM entry in table 17. We find no evidence that LPFM stations adversely affect the full-service commercial FM stations that have similar formats. In fact, all of the point estimates in table 17 are positive, though statistically insignificant.

Table 17
Effect of LPFM Entry on the Ratings of Full-Service Commercial FM Stations with Particular Program Formats

	Miscellaneous Format	Ethnic and Spanish Formats	Religion Format	Miscellaneous, Ethnic, and Religion Formats
Contour Measure				
All Market Ratings	0.018 (0.17)	0.002 (0.21)	0.014 (0.17)	0.014 (1.73)
Home Market Ratings	0.088 (0.28)	0.001 (0.03)	0.027 (1.43)	0.029 (1.59)
Market Measure				
All Market Ratings	0.018 (0.39)	0.017 (1.39)	0.004 (0.49)	0.007 (0.77)
Home Market Ratings	0.088 (0.28)	0.015 (0.53)	0.002 (0.12)	0.008 (0.53)
Contour/Market Measure				
All Market Ratings	0.018 (0.17)	0.006 (0.27)	0.021 (1.44)	0.022 (1.54)
Home Market Ratings	0.088 (0.28)	0.004 (0.12)	0.024 (1.02)	0.028 (1.23)

* - estimated regression coefficient is different from zero at the 95 percent level of confidence.

** - estimated regression coefficient is different from zero at the 99 percent level of confidence.

The coefficient on the number of LPFM stations is reported. Other coefficients are not reported. t-statistics are in parentheses

Ratings analyzed are the average quarter hour rating for persons aged 12+ in the Monday - Sunday 6am – 12m daypart in the Fall ratings period.

Only stations that did not change program format categories between 2005 and 2007 are analyzed.

46. Table 18 reports a similar set of regressions of stations of a particular format; however, it uses the regression specifications of tables 14 and 16. Nearly all of the estimations indicate no statistically significant effect of LPFM stations on these subsets of full-service commercial FM stations. The two exceptions are the religion format and the combined set of formats. However, the estimated impact here is positive. In other words these full-service commercial FM stations are predicted to earn higher ratings upon the entry of LPFM stations. We suggest that this result is simply an artifact of the multiple hypotheses we are testing.

Table 18
Effect of LPFM Entry on the Ratings of Full-Service Commercial FM Stations with
Particular Program Formats: Format Competition

	Miscellaneous Format	Ethnic and Spanish Formats	Religion Format	Miscellaneous, Ethnic, and Religion Formats
Contour Measure				
All Market	-0.040	0.006	0.017	0.016
Ratings	(0.41)	(0.72)	(2.00)*	(2.00)*
Home Market	-0.089	-0.001	0.033	0.032
Ratings	(0.75)	(0.06)	(1.76)	(1.78)
Market Measure				
All Market	-0.044	0.016	0.006	0.007
Ratings	(1.08)	(1.33)	(0.74)	(0.88)
Home Market	-0.089	0.005	0.011	0.012
Ratings	(0.75)	(0.17)	(0.69)	(0.78)
Contour/Market Measure				
All Market	-0.040	0.006	0.027	0.026
Ratings	(0.41)	(0.27)	(1.83)	(1.83)
Home Market	-0.089	-0.013	0.036	0.036
Ratings	(0.75)	(0.39)	(1.55)	(1.61)

* - estimated regression coefficient is different from zero at the 95 percent level of confidence.

** - estimated regression coefficient is different from zero at the 99 percent level of confidence.

The coefficient on the number of LPFM stations is reported. Other coefficients are not reported.

t-statistics are in parentheses

Ratings analyzed are the average quarter hour rating for persons aged 12+ in the Monday - Sunday 6am – 12m daypart in the Fall ratings period.

Only stations that did not change program format categories between 2005 and 2007 are analyzed.

B. Analysis of Revenue

47. In this section we estimate the effect of the presence of an LPFM station on the estimated revenue of full-service commercial FM stations. The regression specifications closely follow those used in the ratings regressions of the previous section.

48. Table 19 examines the effect of different measures of LPFM entry on the revenue per adult in the market earned by the station. We find that when an LPFM station enters the market of a full-service commercial FM station that there is a statistically significant, though small, increase in the commercial station's revenue. Other measures of LPFM entry do not indicate the presence of an effect.

Table 19
Effect of LPFM Entry on the Revenue per Adult of Full-Service Commercial FM Stations

Independent Variable	Contour Measure	Market Measure	Contour/Market Measure
Number of LPFM stations	-0.041 (1.56)	0.069 (2.46)*	0.046 (1.45)
Number of AM stations in market	-0.196 (10.67)**	-0.191 (10.40)**	-0.192 (10.48)**
Number of AM stations in contour	0.192 (6.08)**	0.189 (5.99)**	0.189 (6.00)**
Number of FM stations in market	-0.018 (1.43)	-0.020 (1.60)	-0.018 (1.46)
Number of FM stations in contour	-0.110 (5.25)**	-0.112 (5.36)**	-0.113 (5.39)**
Number of commercial TV stations	-0.055 (1.80)	-0.067 (2.18)*	-0.062 (2.04)*
Number of digital radio stations in market	0.008 (1.34)	0.005 (0.88)	0.006 (1.05)
Number of newspapers in market	0.006 (0.12)	0.002 (0.03)	0.003 (0.06)
Population 18+	-0.000 (2.84)**	-0.000 (2.66)**	-0.000 (2.68)**
Retail expenditures in market	0.000 (0.76)	0.000 (0.66)	0.000 (0.70)
Per capita income in market	-0.000 (2.49)*	-0.000 (1.89)	-0.000 (2.28)*
2007-2009 time effect	-1.042 (27.69)**	-1.028 (27.33)**	-1.031 (27.43)**
Constant	0.042 (1.33)	0.013 (0.39)	0.023 (0.73)

* - estimated regression coefficient is different from zero at the 95 percent level of confidence.

** - estimated regression coefficient is different from zero at the 99 percent level of confidence.

t-statistics are in parentheses

Revenue per adult is calculated as the station revenue divided by the population 18+ in the station's home market.

Observations are for stations that are home to an Arbitron Metro and did not change program format categories between 2005 and 2009.

49. Table 20 presents results using different measures of full-service station competition. Similar to the results of table 19, some of our measures of LPFM entry do have a statistically significant effect on revenue in the positive direction.

Table 20
Effect of LPFM Entry on the Revenue per Adult of Full-Service Commercial FM Stations: Format Competition

Independent Variable	Contour Measure	Market Measure	Contour/ Market Measure
Number of LPFM stations	-0.012 (0.45)	0.085 (3.02)**	0.078 (2.43)*
Number of similar format AM stations in market	-0.034 (1.73)	-0.031 (1.59)	-0.031 (1.58)
Number of similar format FM stations in market	-0.015 (2.37)*	-0.016 (2.55)*	-0.015 (2.45)*
Number of similar format non-commercial stations in market	0.008 (0.33)	0.013 (0.52)	0.011 (0.42)
Number of commercial TV stations in market	-0.119 (4.05)**	-0.131 (4.44)**	-0.125 (4.27)**
Digital radio stations in market	-0.024 (4.34)**	-0.027 (4.72)**	-0.025 (4.55)**
Retail expenditures in market	-0.000 (2.98)**	-0.000 (3.15)**	-0.000 (3.06)**
Population density of market	-0.002 (3.14)**	-0.002 (2.74)**	-0.002 (2.90)**
2007-2009 Time Effect	-1.076 (29.35)**	-1.059 (28.78)**	-1.064 (28.98)**
Constant	-0.004 (0.12)	-0.028 (0.93)	-0.022 (0.73)

* - estimated regression coefficient is different from zero at the 95 percent level of confidence.

** - estimated regression coefficient is different from zero at the 99 percent level of confidence.

t-statistics are in parentheses

Revenue per adult is calculated as the station revenue divided by the population 18+ in the station's home market.

Observations are for stations that are home to an Arbitron Metro and did not change program format categories between 2005 and 2009.

50. We now turn to examining the effect on the revenue of full-service commercial FM stations in specific program formats. Table 21 replicates the regressions of table 19 for each of the specific sub-groups of full-service commercial FM stations. The results are interesting. We find a statistically significant negative effect on the revenue of full-service commercial FM stations broadcasting a religious format. Our estimates indicate that if an LPFM station enters a market it will reduce the full-service commercial FM station's revenue per adult in the market by \$0.124 per year. This is approximately 10 percent of the revenue the average religious formatted full-service commercial FM station was estimated to earn in 2009. However, as table 22 illustrates, the estimated effect of the entry of a full-service radio station is found to be less than that of entry by an LPFM station. These two results are difficult to reconcile.

Table 21
Effect of LPFM Entry on the Revenue per Adult of Full-Service Commercial FM Stations
with Particular Program Formats

	Miscellaneous Format	Ethnic and Spanish Formats	Religion Format	Miscellaneous, Ethnic, and Religion Formats
Contour Measure	0.203 (0.58)	0.081 (0.99)	-0.180 (2.77)**	-0.112 (1.26)
Market Measure	-0.044 (0.12)	0.076 (0.93)	-0.124 (2.18)*	-0.112 (1.39)
Contour/Market Measure	0.120 (0.31)	0.150 (1.49)	-0.240 (-3.16)**	-0.164 (1.54)

* - estimated regression coefficient is different from zero at the 95 percent level of confidence.

** - estimated regression coefficient is different from zero at the 99 percent level of confidence.

The coefficient on the number of LPFM stations is reported. Other coefficients are not reported.

t-statistics are in parentheses

Revenue per adult is calculated as the station revenue divided by the population 18+ in the station's home market.

Observations are for stations that are home to an Arbitron Metro and did not change program format categories between 2005 and 2009.

Table 22
Effect of LPFM Entry on the Revenue per Adult of Full-Service Commercial FM Stations with a Religion Program Format

Independent Variable	Contour Measure	Market Measure	Contour/Market Measure
Number of LPFM stations	-0.180 (2.77)**	-0.124 (2.18)*	-0.240 (3.16)**
Number of AM stations in market	-0.106 (2.62)**	-0.101 (2.48)*	-0.110 (2.73)**
Number of AM stations in contour	0.117 (1.78)	0.104 (1.55)	0.107 (1.64)
Number of FM stations in market	0.009 (0.31)	0.006 (0.20)	0.009 (0.31)
Number of FM stations in contour	-0.000 (0.01)	-0.001 (0.02)	0.002 (0.05)
Number of commercial TV stations	0.027 (0.30)	0.030 (0.33)	0.033 (0.36)
Number of digital radio stations in market	0.015 (1.11)	0.020 (1.46)	0.016 (1.18)
Number of newspapers in market	-0.232 (2.25)*	-0.249 (2.40)*	-0.228 (2.22)*
Population 18+	-0.000 (1.16)	-0.000 (0.97)	-0.000 (0.90)
Retail expenditures in market	-0.000 (0.51)	0.000 (0.08)	-0.000 (0.23)
Per capita income in market	-0.000 (1.70)	-0.000 (2.24)*	-0.000 (2.14)*
2007-2009 time effect	-0.301 (3.64)**	-0.304 (3.64)**	-0.299 (3.64)**
Constant	-0.058 (0.86)	-0.059 (0.87)	-0.051 (0.76)

* - estimated regression coefficient is different from zero at the 95 percent level of confidence.

** - estimated regression coefficient is different from zero at the 99 percent level of confidence.

t-statistics are in parentheses

Revenue per adult is calculated as the station revenue divided by the population 18+ in the station's home market.

Observations are for stations that are home to an Arbitron Metro and broadcast a religion program format in 2005, 2007, and 2009.

51. Table 23 presents estimates similar to those of table 21 but with the regression specifications of table 20. The regression specification uses different measures of competition from full-service radio stations. These measures count the number of full-service radio stations of the same format in the market. The findings are also quite similar to those of table 21. We find a statistically significant impact on the revenue of stations with a religion format. However, as with the results of table 22, table 24 indicates that the LPFM effect outweighs the estimated effect from competition with other religious formatted full-service stations. Consequently, we are forced to conclude that the LPFM effect we are

finding here is likely to be due to a failure to control for unobserved effects that are correlated with LPFM entry.

Table 23
Effect of LPFM Entry on the Revenue per Adult of Full-Service Commercial FM Stations
with Particular Program Formats: Format Competition

	Miscellaneous Format	Ethnic and Spanish Formats	Religion Format	Miscellaneous, Ethnic, and Religion Formats
Contour Measure	0.175 (0.47)	0.085 (1.06)	-0.171 (2.60)**	-0.111 (1.25)
Market Measure	-0.003 (0.01)	0.057 (0.68)	-0.100 (1.72)	-0.085 (1.06)
Contour/Market Measure	0.213 (0.52)	0.118 (1.18)	-0.220 (2.82)**	-0.125 (1.18)

* - estimated regression coefficient is different from zero at the 95 percent level of confidence.

** - estimated regression coefficient is different from zero at the 99 percent level of confidence.

The coefficient on the number of LPFM stations is reported. Other coefficients are not reported.

t-statistics are in parentheses

Revenue per adult is calculated as the station revenue divided by the population 18+ in the station's home market.

Observations are for stations that are home to an Arbitron Metro and did not change program format categories between 2005 and 2009.

Table 24
Effect of LPFM Entry on the Revenue per Adult of Full-Service Commercial FM Stations with a Religion Program Format: Format Competition

Independent Variable	Contour Measure	Market Measure	Contour/ Market Measure
Number of LPFM stations	-0.171 (2.60)**	-0.100 (1.72)	-0.220 (2.82)**
Number of similar format AM stations in market	0.001 (0.03)	0.007 (0.19)	0.004 (0.11)
Number of similar format FM stations in market	-0.067 (0.92)	-0.063 (0.86)	-0.057 (0.78)
Number of similar format non-commercial stations in market	-0.037 (0.76)	-0.036 (0.74)	-0.038 (0.78)
Number of commercial TV stations in market	0.069 (0.73)	0.064 (0.67)	0.071 (0.75)
Digital radio stations in market	-0.003 (0.21)	-0.000 (0.00)	-0.003 (0.25)
Retail expenditures in market	-0.000 (1.03)	-0.000 (0.58)	-0.000 (0.89)
Population density of market	0.005 (1.84)	0.004 (1.34)	0.004 (1.44)
2007-2009 Time Effect	-0.334 (4.08)**	-0.342 (4.12)**	-0.332 (4.08)**
Constant	-0.038 (0.55)	-0.046 (0.64)	-0.033 (0.47)

* - estimated regression coefficient is different from zero at the 95 percent level of confidence.

** - estimated regression coefficient is different from zero at the 99 percent level of confidence.

t-statistics are in parentheses

Revenue per adult is calculated as the station revenue divided by the population 18+ in the station's home market.

Observations are for stations that are home to an Arbitron Metro and broadcast a religion program format in 2005, 2007, and 2009.

V. Conclusions

52. Our analysis of the impact of LPFM stations on full-service commercial FM stations began with a simple statistical analysis that compared the average economic performance of full-service commercial FM stations that did not have an LPFM station present in their service territory to stations that did have an LPFM station present in their service territory. This preliminary analysis found both positive and negative impacts on full-service commercial FM stations. We interpret this wide variation in estimated effects as evidence of the non-random presence of LPFM stations and the need to control, where feasible, for unobserved market and station characteristics that are correlated with the presence of LPFM stations. This conclusion led to the application of statistical methods which will control for a large portion of the unobserved market and station characteristics.

53. Our findings from our regression analysis are reasonably robust to different methods of measuring the presence of LPFM stations as well as different measures of competition from other full-service radio stations. This analysis allows us to conclude that LPFM stations have no measurable effect on the economic performance of the average full-service commercial FM station. When we use

regressions to examine ratings data, we find in most cases that LPFM entry does not have a statistically significant impact on the Arbitron ratings of full-service commercial FM stations. In those cases in which we do find a statistically significant impact, it appears to be trivial. We also use regression analysis to estimate the effect of the presence of LPFM stations on the revenues of full-service commercial FM stations. Several of these regressions find that, when an LPFM station enters the service area of a full-service commercial FM station, the full-service station will experience a small, statistically significant increase in revenue. However, when we use other regression specifications or measures of LPFM entry, no statistically significant effects are observed. Analysis of full-service commercial FM stations that broadcast particular program formats yielded some evidence that LPFM stations may have an adverse impact on stations broadcasting a religion format. However, further analysis that compared the estimated effect of LPFM stations on this subset of full-service commercial FM stations to the estimated effect of competition from other full-service stations caused us to question the result. It was estimated that the effect of an LPFM station was several magnitudes larger than the effect of a full-service station. We consider this result to be unrealistic and instead conclude that this single piece of evidence represents spurious correlation due to our inability to fully control for the market and station characteristics that are correlated with LPFM entry. As such, our final conclusion is that the analysis finds no statistically reliable evidence that LPFM stations have a consistent effect on the economic performance of full-service commercial FM stations.